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To three pioneering tortricidologists:

James Brackenridge Clemens, 1829?–1867
Thomas de Grey Walsingham, Sixth Earl, 1843–1919
Carl Heinrich, 1880–1955

Contents

Introduction

Tortricidae comprise the fourth largest family of North American Lepidoptera, and the subfamily Olethreutinae contains three-fourths of the species. Larvae of this large subfamily feed on buds, shoots, stems, leaves, flowers, fruit, seed, and roots of herbs, shrubs, and trees. Some familiar common names of olethreutine species in Midland North America are blackheaded fireworm, boxelder twig borer, cherry fruitworm, codling moth, European pine shoot moth, eyespotted bud moth, hickory shuckworm, oriental fruit moth, pea moth, spruce needle-miner, and strawberry leafroller (Werner 1982). Midland North America refers here to Michigan, Wisconsin, and Minnesota.

The available handbooks on North American Olethreutinae appeared more than a half century ago (Forbes 1923; Heinrich 1923b, 1926). The need for modern coverage of the subfamily has grown as new species, synonyms, and errors have emerged. Some genera have recently been reviewed, such as *Zeiraphera* (Mutuura and Freeman 1966), *Rhyacionia* (Powell and Miller 1978), and *Corticivora* (Brown 1984). But only works of broader scope comparable to the modern handbooks on Eurasian olethreutines (Benander 1950, Bentinck and Diakonoff 1968, Bradley *et al.* 1979, Hannemann 1961, Kuznetsov 1978, and others) adequately serve some purposes. This Guide treats adults, but larval hosts are also given. Works on larval taxonomy of North American as well as Eurasian species are available (MacKay 1959, 1962; Swatschek 1958).

Past family-level works might lead one to conclude erroneously that the olethreutine fauna in Midland North America is scant. Fernekes (1906) listed only 28 species in 9 genera for Milwaukee County, WI. The material on which Heinrich's (1923b, 1926) revisions were based included specimens from Michigan, Wisconsin, and Minnesota for only 30 species in 17 genera. Huang (1962) reviewed the Grapholitini (formerly Laspeyresiini) of Wisconsin, one of three olethreutine tribes, and recorded only 11 species in 5 genera. The present Guide includes 286 species or species complexes in 47 genera, which are 35 percent and 80 percent, respectively, of these olethreutine categories known in North America (Powell 1983).

This Guide began to be assembled two decades ago. Designed as a compact working tool and reference, it emphasizes comprehensive regional coverage, diagnostics of genera and species, accurate species identities, and sources of further systematics as well as biological literature. Potential users are detection and survey entomologists in a region where agriculture and forestry are immensely important; researchers in systematics, biology, and faunistics; some educators; some students; and not least, some avocational entomologists. Much of the specimen base underlying the Guide is due to dedicated recreational collecting and curating.

Species were included only if one or more examined adults originated in Michigan, Wisconsin, or Minnesota. The Guide serves as a record of species occurrence in each State of the region. The search for study material was extensive, and nearly 7,000 pertinent specimens were assembled. Some characteristics of the sample are summarized by State in table 1. Michigan's first rank in both species abundance measures is probably due more to the large proportion of sample specimens originating there than to other factors. More specimens might

Table 1—Distribution of the olethreutine sample by States

State	Percentage of region in State[1]	Percentage of specimens originating in State[2]	Percentage of regional species found in State[3]	Percentage of regional species found exclusively in State
Michigan	30	65	90	28
Wisconsin	28	20	51	2
Minnesota	42	15	50	6
Total	100	100		

[1]Total of 495,441 km² of land area in the three-State region, excluding inland waters.
[2]Total of 6,936 specimens in the Michigan–Wisconsin–Minnesota sample.
[3]Total of 286 species and species complexes found in the three-State region.

add species records appreciably in Wisconsin and Minnesota, but not appreciably in the region as a whole.

The study material is located in source institutions as follows:

	Percentage of sample
Michigan State University Entomology Museum, East Lansing	47
University of Michigan Museum of Zoology, Ann Arbor	15
University of Minnesota Entomology Museum, St. Paul	15
University of Wisconsin Entomology Museum, Madison	13
Essig Museum of Entomology, University of California, Berkeley	6
Others	4
(Field Museum of Natural History, Chicago; Illinois Natural History Survey, Urbana; National Museum of Natural History, Washington, DC; American Museum of Natural History, New York; Los Angeles County Museum of Natural History, Los Angeles; E.G. Voss collection, Ann Arbor, MI; Canadian National Collection of Insects, Ottawa)	
Total	100

Nearly all the study material was captured at lights. The most frequent collectors in Michigan were S. Moore, W.C. Stinson, R.R. Dreisbach, W.W. Newcomb, J.P. Donahue, M.C. Nielsen, J.H. Newman, and R.L. Fischer; in Wisconsin, H.M. Bower, R.D. Shenefelt, W.E. Sieker, E.F. Legner, J.T. Eschle, and E.R. Oatman; and in Minnesota, O. Lugger, W.E. Miller, and D.G. Denning.

Nearly 2,600 genitalia were prepared for identification and illustration, using the method of Clarke (1941). Each preparation bears the name of one of the following preparators: B.J. Thompson, C.D. Waddell, V. Adams, P. Jacus, R.B. Moore, J.A. Blackwell, P. Brigham, K. Lindstrom, K.A. Kohn, C.W. Taylor, L. Holtz, D. Hagler, J.T. Eschle, L.K. Miller, W.E. Miller, M.A. Menke, K. Hosfield, A.C. Collison, J.M. Muggli, S.M. Galeota, H. Scroggins, M.M. Dooher, and L.S. Bauer. Voucher specimens are not otherwise labeled. Genitalia were drawn by U. Daigle. Wings were prepared and drawn by M.G. Pogue. All drawings were made firsthand from specimens.

In addition to the persons already named, I am indebted to R.L. Fischer, T.E. Moore, P.J. Clausen, Steven Krauth, J.A. Powell, the late Henry Dybas, G.L. Godfrey, D.R. Davis, F.H. Rindge, J.P. Donahue, W.S. Craig, J.R. Heitzman, and the late T.N. Freeman for specimen loans; to R.L. Brown, J.A. Powell, and R.W. Hodges for suggesting ways to improve the manuscript; to R.L. Brown for identifying *Epinotia* specimens to reflect his new revision of the genus; to R.L. Kuehn and G.G. Ahlstrand for scanning electron photomicrography; and to Phyllis Moline for painstakingly typing the manuscript.

Vegetation of the Region

Climate, soils, physiography, and other environmental features of Midland North America are treated in many atlases. Merz (1979) briefly summarizes some background features. Much of the region's environment and history is integrated in its vegetation. Moreover, because olethreutines are seldom polyphagous (Powell 1980), their species diversity in the region can be expected to correlate with the region's vegetative diversity. Larval hosts are reported for 71 percent of the species and species complexes treated in this Guide. However, host profiles for very few species are exhaustive; for most, host information is still fragmentary or lacking.

Küchler's (1964) potential or original vegetation provides a convenient way to characterize the vegetation. Twelve potential vegetation units occupy significant areas of Michigan, Wisconsin, and Minnesota (table 2). Bluestem prairie leads at 15.8 percent of vegetated area, followed by northern hardwoods, pine forest, and others. Exhaustive generic or specific components of units can be found in Küchler (1964). None of the three States has a profile of unit areas similar to that of the three together. The combined profile reflects both forest and plains biomes. With the fewest forest units, and the largest prairie and spruce–fir units, Minnesota is the most plainslike and boreal of the three States. These characteristics, together with large total area, suggest why, despite the smaller proportion of specimens originating in Minnesota, it had more exclusive species occurrences than Wisconsin (table 1).

Table 2—Potential vegetation of Michigan, Wisconsin, and Minnesota as calculated from areas mapped in Küchler (1964)

	Percentage of vegetated area			
Vegetation unit	**Michigan**	**Wisconsin**	**Minnesota**	**Total**
Bluestem prairie	0.1	1.4	14.3	15.8
Northern hardwoods	5.9	9.2	0	15.1
Pine forest	5.7	3.8	5.1	14.6
Oak savanna	0	7.6	4.4	12.0
Maple–basswood forest	0	3.4	6.3	9.7
Spruce–fir forest	0	0.7	6.9	7.6
Northern hardwoods–fir forest	5.6	1.6	0	7.2
Oak–hickory forest	6.6	0	0	6.6
Conifer bog	0.9	1.6	3.7	6.2
Beech–maple forest	1.9	0	0	1.9
Elm–ash forest	1.9	0	0	1.9
Floodplain forest	0	0.1	1.3	1.4
Total				100.0

Subfamily Olethreutinae: Definition and Diagnosis

Forewing 4 to 20 mm long.

Head rough-scaled above. Antenna less than two-thirds forewing length, scales of flagellar segments originating in a well-defined ring. Labial palpus rough-scaled, third segment usually short and horizontal. Ocelli and chaetosemata present.

Metanotal scales longer and paler than mesonotal scales, restricted to lateral areas. Tibiae with all spurs present. Forewing with 11 or 12 veins: R_4 and R_5 separate, stalked, or united; M_2 and M_3 separate, approximate, or connate; Cu_2 originating before distal three-fourths of discal cell (except *Evora*); 1A usually atrophied, 2A and 3A united for more than half their length distally; remaining veins separate.

Hindwing with 7 or 8 veins; Sc-R_1 free; Rs and M_1 approximate toward base or stalked (except *Dichrorampha*); M_3 and Cu_1 separate, connate, stalked, or united; cubital vein of discal cell with pecten on upper side toward base (except *Sereda* and some *Cydia*).

Valva of male genitalia strongly sclerotized except for a basal opening, usually with differentiated cucullus; gnathos membranous to strongly sclerotized, usually fused with lower surface of the tuba analis; fultura superior absent; processus basalis rudimentary or absent. Uncus present or absent.

Abdominal sternum 7 of female simple to deeply emarginate around ostium bursae, or inflected and overlapping it. Lamella antevaginalis and lamella postvaginalis present or absent. Apophyses anteriores and sterigma unconnected. Ductus bursae variable in length, nonsclerotized, partly sclerotized, or entirely sclerotized; corpus bursae without a signum, with a single signum or two signa.

Olethreutinae appears to be monophyletic. Synapomorphies include restriction of scale origins to one partial or complete ring on antennal flagellar segments, presence of a basal opening in male valval sclerotization, and lack of connection between female apophyses anteriores and sterigma.

Information in this section was drawn chiefly from Heinrich (1923b), Horak (1984), Obraztsov (1958), and Razowski (1976). The second- and last-named authors review the history of tortricid classification, and the former evaluates the characters used.

Adult Olethreutinae originating in Midland North America can also be diagnosed with keys to families of Lepidoptera such as that in Borror *et al.* (1981).

Structural Characters

All characters used in keys, in subfamilial and generic diagnoses, and many characters otherwise mentioned in this Guide are summarized below. An effort was made to select characters whose variability could readily be resolved to binary states, and characters for which a given state applies to the species of a genus without exception. This reduces instances where the user must resolve inexact terms like "sometimes" or "often." When not clearly established by previous authors, such characters were established here by examining the Midland North American representatives.

Characters and states are illustrated where species having them appear in the Systematics section. The characters and page numbers of illustrations are grouped below according to sex and body part. The illustrations represent any degree of manifestation, not necessarily extremes.

Venation can usually be revealed by touching a capillary tube of solvent such as xylol to the wings while light is directed through them; the solvent evaporates quickly and does not harm the specimen. Genitalic characters can sometimes be revealed by brushing away scaling, but more elaborate preparation (Clarke 1941) may be necessary. Nomenclature of wing veins and genitalia follows Borror *et al.* (1981) and Klots (1970), respectively. Venation character states pertain to vein origins unless otherwise specified.

Most structural characters are practically invariant, but venation may be an exception. The keys and diagnoses are based on sample sizes that may not encompass the extensive variation in venation that Tripp (1954) found in one species. To minimize risk of identification errors, the user should consider co-occurring nonvenational character states and use more than one specimen whenever possible.

In many genera, species are distinguishable more often by shape or outline of the male valva and the female ostium bursae and associated structures, than by any other structures. Small differences in orientation of valvae on microslides can lead to perceived differences in valval outline; instances are noted by Diakonoff (1964:67) and Powell and Miller (1978:10). In this Guide, drawings are of valvae mounted as near flat as attainable without distortion. The user should ensure that valvae for comparison are similarly oriented.

Both Sexes

R_4 and R_5 united 62
M_2 and M_3 connate 39
M_2, M_3, and Cu_1 approximate at termen 62
Cu_2 originating before distal two-thirds of discal cell 67
Cu_2 originating at or beyond distal three-fourths of discal cell 37

Hindwing

Veins Rs and M_1 approximate toward base or connate 38
M_2 and M_3 approximate, or M_2 appreciably bent at base 18
M_2 and M_3 remote 33
M_3 and Cu_1 separate 16
M_3 and Cu_1 connate 18
Cubital vein with pecten on upper side 15

Male

Antenna

Notched near base 41

Legs

Hindmost tibia with dilated and tufted scaling 24
Hindmost tibia with basal hair pencil 31

Forewing

With costal fold. Grant (1978) examined the anatomy of the costal fold and associated hair pencils 58

Hindwing

Anal margin modified 36
Anal margin with lobe 31
Upper surface with melanic sex scaling. Brown and P.R. Miller (1983) examined structure and function of these scales 64

Abdomen

Segment 1 with paired ventrolateral papilliform scale pockets 17
Segments 6 and 7 with modified dorsal hair tufts beneath scaling 86
Segment 8 with paired lateral tufts. Baker and Cardé (1979) demonstrated the courtship function of these tufts 89

Genitalia

Uncus present or developed 78
Uncus bifid 78
Uncus bifurcate 72
Socius or hamus present 39
Socius finger- or ribbonlike and not heavily sclerotized 39
Anellus loosely surrounding aedeagus 78
Valva with basal opening in sclerotization 21
Valva divided 83
Valval sacculus densely clothed with spinelike setae 76
Valva with rudimentary clasper 63
Mid-point of valval neck nearer base than apex of valva 59
Cross-sectional width of valva at mid-point of neck relative to lineal sacculus width 88
Valval Sc_1 at or near base of cucullus 23
Valval Sc_1 on neck projection separate from cucullus 17
Valval Sc_2 on a projecting digitus 20
Valval outer surface with spinelike setae 19
Valval cucullus with thick spinelike seta projecting from lower margin 55
Valval cucullus lacking thick spinelike seta; may have thin spinelike seta projecting from lower margin 50
Vesica of aedeagus with cornuti 60
Vesica with some cornuti nondeciduous 60

Female

Abdomen

Sternum 7 emarginate posteriorly 86
Sternum 7 deeply emarginate 68
Sternum 7 inflected and overlapping ostium bursae 71
Sternum 7 with median bilobed projection over ostium bursae 41

Genitalia

Apophyses anteriores (apo ant) and sterigma unconnected 67
Lamella antevaginalis (lam antevag) conical, and lamella postvaginalis (lam postvag) absent 78
Lamella antevaginalis wider than lamella postvaginalis in anteroposterior orientation 19
Lamella postvaginalis narrow, recessed, and ostium bursae elongate 65
Ductus bursae sclerotized with or without minor discontinuities from near genital opening to two-thirds or more its length 24
Corpus bursae with sides sclerotized 72
Corpus bursae with two signa 54
Signa thornlike 87
Signa finlike 54
Signa scobinate 23
Signa bladelike 80
Signa pocketlike 18

Ovipositor

Papillae anales with ventral extensions 49

Generic Diagnosis

The generic diagnoses appearing in the Systematics section utilize only those characters and character states that vary among the genera of a given tribe. For example, presence or absence of vesical cornuti is used to help diagnose genera of Olethreutini because cornuti occur in some genera and not in others; this character is not used for genera of Eucosmini because cornuti occur in all of them. This policy maximizes the usefulness of each character, avoids burdening diagnoses with excess characters, and reduces repetition. In contrast, the keys use all available characters because the keys are not divided into sections by tribe.

The failure of the female key to separate three groups of three to eight genera indicates a need for comparative studies to redefine categories or uncover new diagnostic characters. In these groups, the species illustrations should suffice to identify genera as well as species. One-third of the genera are monotypic or thus far are represented by only one species in Midland North America. Identifying these genera also identifies their species.

Generic diagnoses contain a Comments section with information about the following topics: monotypy; characters that apply less than genus-wide if any; total number of Nearctic species, based mainly on Powell (1983); extra-Nearctic occurrence of species, based on Benander (1950), Bentinck and Diakonoff (1968), Bradley *et al.* (1979), Hannemann (1961), and Kuznetsov (1978); known time of introduction if introduced; literature concerning substantial reviews of Nearctic species, and generic treatments; unconfirmed reports of species in Michigan, Wisconsin, and Minnesota; difficulties that may be encountered in diagnosing species; and species that are considered complexes. For genera with no literature citations, the treatments by Heinrich (1923b, 1926) are still applicable.

Keys to Genera

Shortest-path keys for use with adults of each sex were generated almost entirely by computer (Pankhurst 1970). They apply chiefly to the Midland North American fauna and may be inadequate for use elsewhere or for use with species yet to be discovered in the region. To locate illustrations of key characters, see the Structural Characters section.

Males

19. Hindwing Rs and M_1 approximate toward base or connate *20*
Not so *36*
20. Forewing upper internal vein of discal cell originating between R_1 and R_2 ..... *21*
Not so ..... *Rhopobota* 72
21. Forewing veins R_4 and R_5 united ..... *Sonia* 62
Not so *22*
22. Hindwing veins M_3 and Cu_1 connate ..... *Episimus* 14
Not so *23*
23. Forewing veins M_2 and M_3 connate *24*
Not so *25*
24. Valva of genitalia with rudimentary clasper ..... *Retinia* 39
Not so ..... *Barbara* 40
25. Socius of genitalia finger- or ribbonlike and not heavily sclerotized *26*
Not so *31*
26. Forewing with costal fold *27*
Not so ..... *Phaneta* 41
27. Vesica of aedeagus with some cornuti nondeciduous ..... *Notocelia* 60
Not so *28*
28. Valval cucullus of genitalia with thick spinelike seta projecting from lower margin ..... *Pelochrista* 54
Valval cucullus with or without thin spinelike seta projecting from lower margin *29*
29. Valva of genitalia with rudimentary clasper ..... *Epiblema* (part) 55
Not so *30*
30. Mid-point of valval neck distinctly nearer base than apex of valva ..... *Epiblema* (part) 55
Not so ..... *Eucosma* 48
31. Forewing apex falcate ..... *Ancylis* 78
Not so *32*
32. Valval sacculus of genitalia densely clothed with spinelike setae *33*
Not so ..... *Zeiraphera* 65
33. Uncus of genitalia developed *34*
Not so *35*
34. Anellus loosely surrounding aedeagus ..... *Catastega* 77
Not so ..... *Epinotia* 73
35. Forewing with raised scale tufts ..... *Gretchena* 70
Not so ..... *Pseudexentera* 66
36. Forewing R_4 and R_5 united ..... *Suleima* 61
Not so *37*
37. Forewing upper internal vein of discal cell originating between R_1 and R_2 ..... *38*
Not so ..... *Gypsonoma* 62
38. Hindwing M_2 and M_3 approximate, or M_2 appreciably bent at base ..... *Bactra* 14
Not so *39*
39. Forewing termen concave ..... *Talponia* 85
Not so *40*
40. Abdominal segment 8 with paired lateral tufts ..... *Larisa* 87
Not so ..... *Corticivora* 90
41. Forewing M_2 and M_3 connate ..... *Rhyacionia* 37
Not so *42*
42. Hindwing Rs and M_1 approximate toward base or connate *43*
Not so ..... *Dichrorampha* 83

43. Abdominal segment 8 with paired lateral tufts ..... *Grapholita* 88
Not so *44*
44. Valva of genitalia with spinelike setae on outer surface ..... *Aterpia* 19
Not so *45*
45. Vesica of aedeagus with cornuti *46*
Not so *49*
46. Forewing upper internal vein of discal cell originating between R_1 and R_2 ..... *47*
Not so *48*
47. Abdominal segments 6 and 7 with modified dorsal hair tufts beneath scaling ..... *Pammene* 85
Not so ..... *Cydia* (part) 91
48. Forewing termen concave ..... *Pseudogalleria* 95
Not so ..... *Ecdytolopha* 95
49. Thorax with posterior tuft *50*
Not so ..... *Cydia* (part) 91
50. Valva of genitalia with Sc_1 at or near base of cucullus ..... *Lobesia* 17
Not so ..... *Endopiza* 15

Females

1. Hindwing cubital vein with pecten on upper side *2*
Not so ..... *Sereda* 87
2. Hindwing veins Rs and M_1 approximate toward base or connate *3*
Not so *29*
3. Forewing upper internal vein of discal cell originating between R_1 and R_2 ..... *4*
Not so *26*
4. Forewing R_4 and R_5 united ..... *Sonia* 62
Not so *5*
5. Hindwing M_2 and M_3 approximate, or M_2 appreciably bent at base .. *6*
Not so *25*
6. Hindwing M_3 and Cu_1 connate *7*
Not so *16*
7. Thorax with posterior tuft *8*
Not so ..... *Episimus* 14
8. Forewing Cu_2 originating at or beyond distal three-quarters of discal cell ..... *Evora* 37
Not so *9*
9. Ductus bursae sclerotized with or without minor discontinuities from near genital opening to two-thirds or more its length ..... *Phaecasiophora* 24
Not so *10*
10. Corpus bursae with two signa *11*
Not so *14*
11. Forewing R_3 and R_4 approximate *12*
Not so ..... *Apotomis* 21
12. Forewing Cu_2 originating before distal two-thirds of discal cell *13*
Not so ..... *Eumarozia* 19
13. Signa of corpus bursae bladelike ..... *Pseudosciaphila* 22
Not so ..... *Hedya* 35
14. Forewing R_3 and R_4 approximate *15*
Not so ..... *Orthotaenia* 23
15. Hindwing M_2 and M_3 remote ..... *Aterpia* 19
Not so ..... *Olethreutes* 25

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16.	Ductus bursae sclerotized with or without minor discontinuities from near genital opening to two-thirds or more its length ..... *Hystricophora*	83
	Not so *17*	
17.	Forewing M_2 and M_3 connate ..... *Rhyacionia, Retinia, Barbara*	37
	Not so *18*	
18.	Hindwing M_3 and Cu_1 separate *19*	
	Not so *20*	
19.	Forewing R_2 originating nearer R_3 than R_1 ..... *Lobesia*	17
	Not so ..... *Endopiza*	15
20.	Signa of corpus bursae bladelike ..... *Ancylis*	78
	Not so *21*	
21.	Abdominal sternum 7 with median bilobed projection over ostium bursae ..... *Spilonota*	41
	Not so *22*	
22.	Lamella antevaginalis conical; lamella postvaginalis absent ..... *Catastega*	77
	Not so *23*	
23.	Sternum 7 deeply emarginate; lamella antevaginalis bordered by ridges of sternum ..... *Proteoteras*	64
	Not so *24*	
24.	Sternum 7 inflected, overlapping ostium bursae; forewing with raised scale tufts ..... *Gretchena*	70
	Not so ..... *Phaneta, Eucosma, Pelochrista, Epiblema, Notocelia, Zeiraphera, Pseudexentera, Epinotia*	41
25.	Forewing Cu_2 originating before distal two-thirds of discal cell ..... *Pammene, Grapholita, Cydia*	85
	Not so ..... *Eucosmomorpha*	86
26.	Forewing M_2, M_3, and Cu_1 approximate at termen ..... *Rhopobota*	72
	Not so *27*	
27.	Forewing termen concave ..... *Pseudogalleria*	95
	Not so *28*	
28.	Hindwing M_2 and M_3 approximate, or M_2 appreciably bent at base ..... *Zomaria*	20
	Not so ..... *Ecdytolopha*	95
29.	Thorax with posterior tuft ..... *Endothenia*	17
	Not so *30*	
30.	Forewing R_4 and R_5 united ..... *Suleima*	61
	Not so *31*	
31.	Forewing upper internal vein of discal cell originating between R_1 and R_2 ..... *32*	
	Not so ..... *Gypsonoma*	62
32.	Hindwing M_2 and M_3 approximate, or M_2 appreciably bent at base ..... *Bactra*	14
	Not so *33*	
33.	Forewing R_1 originating at or near middle of discal cell *34*	
	Not so ..... *Dichrorampha*	83
34.	Forewing termen concave ..... *Talponia*	85
	Not so *35*	
35.	Forewing R_3 and R_4 approximate ..... *Corticivora*	90
	Not so ..... *Larisa*	87

Species Diagnosis

Accounts of species in the Systematics section include illustrations of wing pattern, male valva, and female ostium bursae and associated parts. Also included are approved common names if any (Werner 1982); forewing length range in the Michigan-Wisconsin-Minnesota sample to the nearest 0.5 mm as a size index (Miller 1977b), excluding tegula and including fringe; color group (Kelly and Judd 1955) of one conspicuous forewing element, as estimated in fluorescent light at no greater magnification than 2 times; whether the species is polymorphic (Miller 1977a) or excessively variable, and what aspects of the variation are illustrated; supplementary diagnostic information when the illustrations alone may not suffice, or when a character is striking; range in sample capture dates; States in which the regional sample originated (MI for Michigan, WI for Wisconsin, and MN for Minnesota); voltinism if known; up to three larval host genera (Fernald 1970), or species where larval monophagy or stenophagy is known, or host monotypy occurs, together with feeding mode of the larva if known; most recent systematics literature (indicated by Syst); and most recent or comprehensive biological and larval host literature applicable in Midland North America if any (indicated by Biol).

The following partly coded information appears parenthetically for each species:

- Number of specimens in the Michigan-Wisconsin-Minnesota sample (N).
- Number of sample male genitalia preparations examined (Gm).
- Number of sample female genitalia preparations examined (Gf).
- The type was examined (T).
- Origin of specimens whose wing patterns are illustrated that are not from the Michigan-Wisconsin-Minnesota sample.

Types are extant for most of the species in this Guide. As indicated by the frequent appearance of T, nearly all such specimens were examined to confirm species identities. The modern species type concept began to take hold in North American olethreutine systematics in the early 1900's (Miller 1970), but holotypes were not consistently designated until after 1910. Two-thirds of the species treated here were described before 1910. For them, type specimen examination often involved lectotypes or provisional (unpublished) lectotype selections. Much relevant lectotype information can be found in the type studies of Klots (1942) and Miller (1970, 1973a). Some has appeared in scattered works dealing with identity problems, and these works are usually cited as systematics references for those species. More than one-fifth of the type examinations involved provisional lectotypes, particularly for species described by Walker, Zeller, and Walsingham. In such cases, provisional lectotype selections are believed to be sound, the specimens are well marked, and their publication is continuing.

Systematics

The arrangement of taxa in this Guide follows the current Check List (Powell 1983) as closely as possible. No new taxa or nomenclatural changes are proposed. Synonyms are omitted; for these the user should consult the Check List or the cited systematics literature.

Tribe Olethreutini

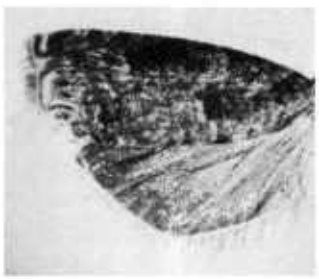
Genus *Episimus*

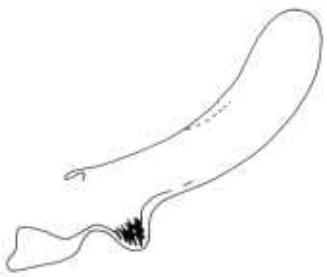
Both sexes. Thorax without posterior tuft. Forewing termen concave, R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 approximate, M_2, M_3, and Cu_1 approximate at termen, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 connate.

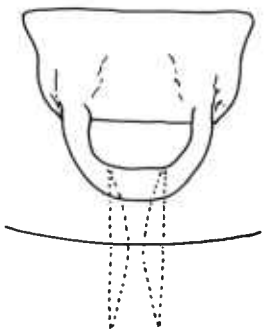
Male. Hindwing inner margin unmodified. Hindmost tibia without dilated or tufted scaling, without basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Socius present; valval outer surface lacking spinelike setae, Sc_1 on neck projection separate from cucullus; vesica with cornuti.

Female. Sternum 7 not emarginate posteriorly. Lamella antevaginalis developed, not wider than lamella postvaginalis in anteroposterior orientation. Ductus bursae sclerotized only at juncture with corpus bursae; corpus bursae with two thornlike signa.

Comments. Three Nearctic species of *Episimus* are known.







Episimus argutanus (Clemens)

Forewing 5.0 to 7.0 mm long, dark markings brown. Adults captured May 13–August 24. MI, MN. Bivoltine. Larva feeds in folded or rolled leaves of *Rhus, Hamamelis, Euphorbia.* Syst: Heinrich (1926). Biol: Jubb (1973).
(36 N, 8 Gm, 2 Gf, T)

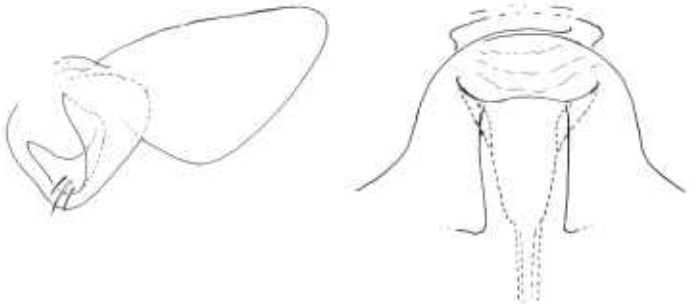
Genus *Bactra*

Both sexes. Thorax without posterior tuft. Forewing termen straight, R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 not approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 stalked, M_2 and M_3 approximate, M_3 and Cu_1 neither united nor stalked.

Male. Hindwing inner margin unmodified. Hindmost tibia without dilated or tufted scaling, without basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Socius present; valval outer surface lacking spinelike setae, Sc_2 not on a projecting digitus.

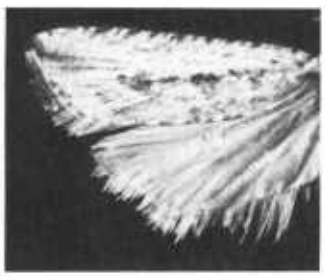
Female. Lamella antevaginalis developed, not wider than lamella postvaginalis in anteroposterior orientation. Ductus bursae sclerotized less than one-third its length from genital opening; corpus bursae with single scobinate signum.

Comments. Six Nearctic species of *Bactra* are known. Among the species treated here, *Bactra furfurana* also occurs in the Palearctic. Diakonoff (1964) gives a generic treatment.



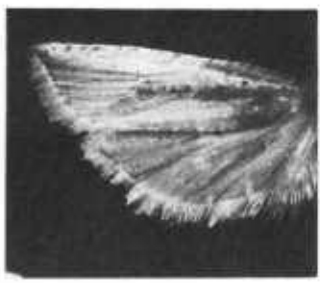
Bactra furfurana (Haworth)

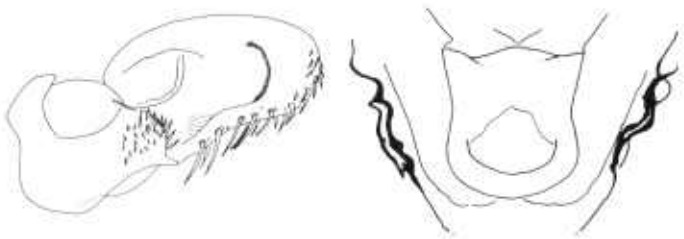
Forewing 5.0 to 7.0 mm long, dark markings brown. Adults captured June 13–August 18. MI, WI, MN. Syst: Diakonoff (1964).
(12 N, 5 Gm, 5 Gf)



Bactra verutana Zeller

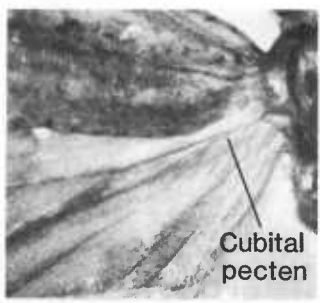
Forewing 5.5 to 8.0 mm long, light areas pale orange yellow. Adults captured July 30–October 15. MI, WI, MN. Multivoltine. Larva feeds on leaves, fascicles, and basal bulbs of *Cyperus esculentus, Scirpus, Juncus*. Syst: Diakonoff (1964). Biol: Frick and Garcia (1975).
(17 N, 5 Gm, 5 Gf, T)





Bactra maiorina Heinrich

Forewing 8.0 to 9.0 mm long, dark markings brown. Adults captured June 26–July 11. MI, MN. Larva feeds on *Scirpus*. Syst: Diakonoff (1964). Biol: Heinrich (1923a).
(2 N, 2 Gm, T, top photo specimen Clay Co., MO)



Genus *Endopiza*

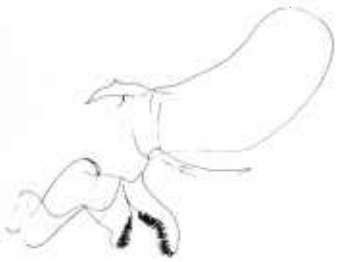
Both sexes. Thorax with posterior tuft. Forewing termen convex, R_2 originating equidistant between R_1 and R_3, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 separate.

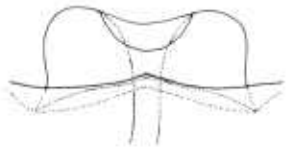
Male. Hindwing inner margin unmodified. Hindmost tibia without dilated or tufted scaling, with basal hair pencil. Abdominal segment 1 with paired ven-

trolateral papilliform scale pockets. Socius and hamus absent; valval outer surface lacking spinelike setae, Sc_1 on neck projection separate from cucullus, Sc_2 not on a projecting digitus; vesica without cornuti.

Female. Ductus bursae sclerotized less than one-third its length from genital opening; corpus bursae without signa.

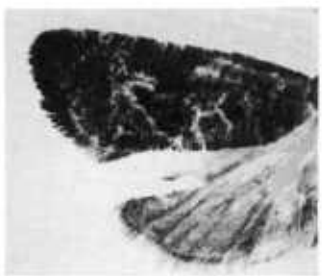
Comments. Nearly 20 Nearctic species of *Endopiza* are known. *Endopiza* (formerly *Paralobesia*) was reviewed synoptically by Obraztsov (1953).

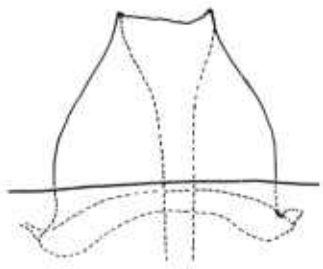




Endopiza viteana Clemens.
Grape berry moth

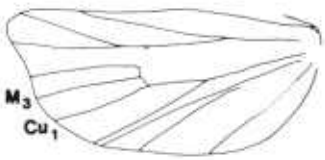
Forewing 4.5 to 6.0 mm long, basal area purplish blue. Adults captured March 10–August 15. MI. Multivoltine. Larva feeds in developing *Vitis* fruit. Syst: Heinrich (1926). Biol: Pettit (1933).
(64 N, 4 Gm, 5 Gf, T)

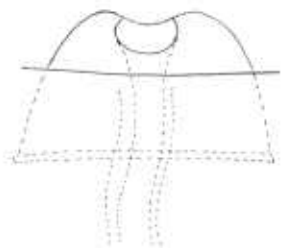




Endopiza spiraeifoliana
(Heinrich)

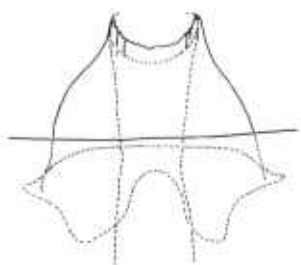
Forewing 4.5 to 5.0 mm long, dark markings brown. Adults captured July 15–August 9. MI, WI. Larva feeds on *Spiraea*. Syst: McDunnough (1938). Biol: Heinrich (1923a).
(5 N, 3 Gm, 2 Gf, T)





Endopiza palliolana
(McDunnough)

Forewing 4.5 to 5.0 mm long, dark markings brown. Adults captured or reared May 30–August 8. MI, MN. Bivoltine. Larva feeds within or on *Larix* needles. Syst: McDunnough (1938). Biol: Mosher and Wilson (1974).
(15 N, 3 Gm, 4 Gf, T)



Endopiza aemulana (Heinrich)

Forewing 5.0 mm long, dark markings brown. Adult captured May 22. MI. Syst: McDunnough (1938).
(1 N, 1 Gf, T)

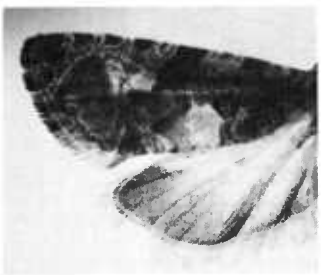
Genus *Lobesia*

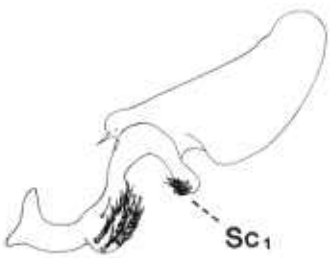
Both sexes. Thorax with posterior tuft. Forewing termen convex, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 separate.

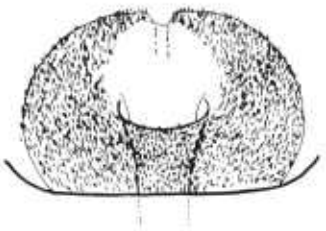
Male. Hindwing inner margin unmodified. Hindmost tibia without dilated or tufted scaling, with basal hair pencil. Abdominal segment 1 with paired ventrolateral papilliform scale pockets. Socius and hamus absent; valval outer surface lacking spinelike setae, Sc_1 at or near base of cucullus, Sc_2 not on a projecting digitus; vesica without cornuti.

Female. Sternum 7 emarginate posteriorly. Ductus bursae sclerotized less than one-third its length from genital opening; corpus bursae without signa.

Comments. Two Nearctic species of *Lobesia* are known. Additional species are known from the Palearctic. The genus was reviewed synoptically by Obraztsov (1953).

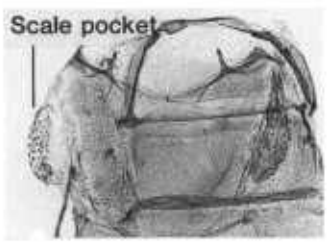






Lobesia carduana (Busck)

Forewing 5.0 mm long, dark markings brown or brownish black. Adult captured July 18. MI. Larva feeds in *Cirsium* terminals. Syst: Heinrich (1926). Biol: Marshall and Musgrave (1937).
(1N, 1 Gf, T, photo specimen Wayne Co., OH)



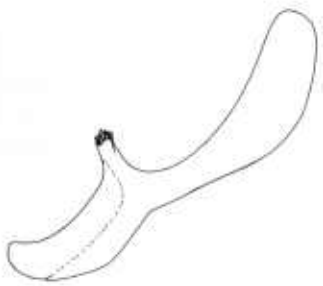
Genus *Endothenia*

Both sexes. Thorax with posterior tuft. Forewing termen straight or convex, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 not approximate, M_2 and M_3 not approximate, M_3 and Cu_1 connate.

Male. Hindmost tibia without dilated or tufted scaling. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Uncus developed; socius present; valval outer surface lacking spinelike setae, Sc_1 nearer sacculus than cucullus.

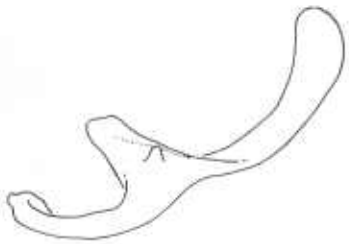
Female. Ductus bursae sclerotized less than one-third its length from genital opening; corpus bursae with single pocketlike signum.

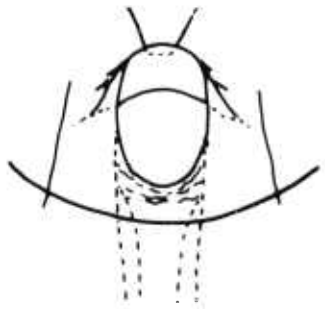
Comments. Fifteen Nearctic species of *Endothenia* are known. Beebe's (1954) report of the Palearctic *E. gentianaeana* (Hübner) in Michigan is erroneous (Miller 1983b). Among the species treated here, *Endothenia hebesana* also occurs in the Palearctic.



Endothenia montanana (Kearfott)

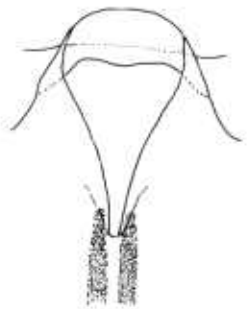
Forewing 7.0 to 8.5 mm long, dark areas grayish brown or brownish black. Male hind leg lacks tibial hair pencil. Adults captured May 22–August 7. MI, WI, MN. Larva feeds in *Stachys* stem bases. Syst: McDunnough (1929). Biol: Putman (1942). (7 N, 5 Gm, 2 Gf, T)





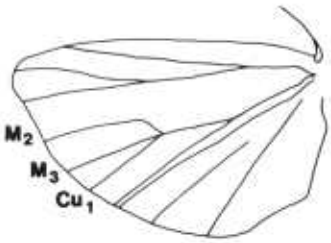
Endothenia affiliana McDunnough

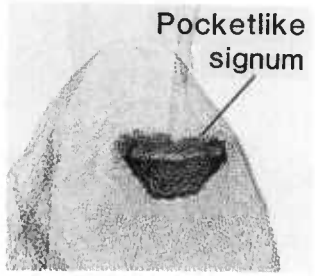
Forewing 5.5 to 7.0 mm long, dark areas grayish brown or brownish black. Adults captured May 13–July 13. MI. Syst: McDunnough (1942). (5 N, 3 Gf, T)

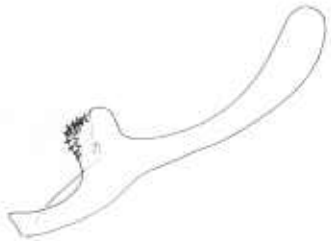


Endothenia hebesana (Walker). Verbena bud moth

Forewing 5.0 to 8.5 mm long, dark areas and markings brown or brownish black. Adults captured May 7–October 5. MI, WI, MN. Multivoltine. Larva feeds in flowers, stems, and seed capsules of *Verbascum, Verbena, Sarracenia,* others. Syst and Biol: Miller (1983b). (84 N, 20 Gm, 10 Gf, T)

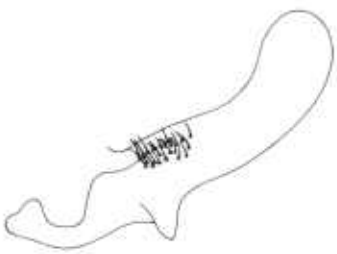


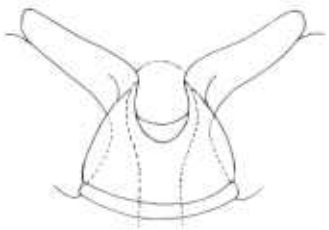




Endothenia nubilana (Clemens)

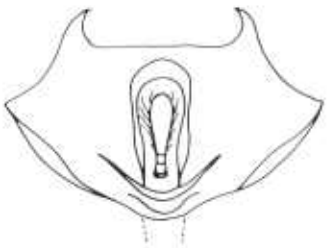
Forewing 7.5 to 10.0 mm long, dark markings brown or brownish black. Adults captured June 16–September 3. MI, WI, MN. Larva feeds in *Stachys* stem bases. Syst: Miller (1983b). Biol: Putman (1942). (34 N, 11 Gm, 4 Gf, T)





Endothenia albolineana (Kearfott). Spruce needleminer

Forewing 5.0 to 6.0 mm long, dark areas grayish yellowish brown. Adults captured May 7–July 17. MI, WI, MN. Univoltine. Larva feeds within or on *Picea* needles. Syst: Heinrich (1926). Biol: Tashiro (1974).
(67 N, 6 Gm, 3 Gf, T)



Endothenia impudens (Walsingham)

Forewing 5.5 to 7.0 mm long, dark areas and markings grayish yellowish brown or brownish black. Adults captured July 5–August 9. MI, WI. Syst: Heinrich (1926).
(14 N, 5 Gm, 2 Gf, T)

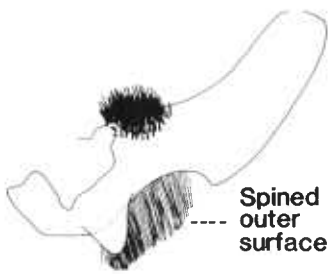
Genus *Aterpia*

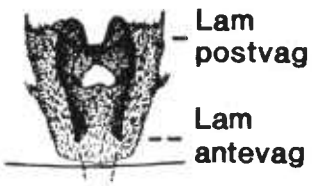
Both sexes. Thorax with posterior tuft. Forewing termen convex, R_1 originating well before middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 not approximate, M_3 and Cu_1 connate.

Male. Hindwing inner margin unmodified. Hindmost tibia without dilated or tufted scaling, without basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Socius and hamus absent; valval outer surface with spinelike setae, Sc_1 at or near base of cucullus; vesica without cornuti.

Female. Sternum 7 not emarginate posteriorly. Lamella antevaginalis developed, wider than lamella postvaginalis in anteroposterior orientation. Ductus bursae sclerotized near middle; corpus bursae with single scobinate signum.

Comments. Only one Nearctic species of *Aterpia* is known. Additional species are known from the Palearctic.





Aterpia approximana (Heinrich)

Forewing 6.0 to 7.5 mm long, dark areas brownish black. Adults captured June 14–September 6. MI, WI. Larva feeds in rolled *Lysimachia* leaves. Syst: Heinrich (1926). Biol: Godfrey *et al.* (1987).
(12 N, 7 Gm, 2 Gf, T)

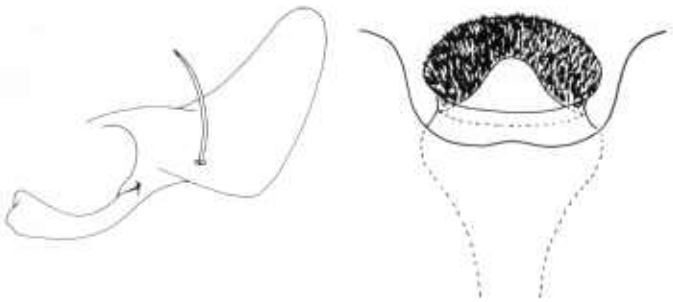
Genus *Eumarozia*

Both sexes. Thorax with posterior tuft. Forewing termen convex, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 connate.

Male. Hindwing inner margin modified into a sclerotized ridge. Hindmost tibia without dilated or tufted scaling, without basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Uncus not developed; socius present; valval outer surface lacking spinelike setae, Sc_1 consisting of one spinelike seta at or near base of cucullus, Sc_2 not on a projecting digitus; vesica without cornuti.

Female. Sternum 7 emarginate posteriorly. Ductus bursae sclerotized entire length; corpus bursae with two thornlike signa.

Comments. Only one Nearctic species of *Eumarozia* is known. Additional species are known from the Neotropics. The genus was reviewed by Clarke (1973).



Eumarozia malachitana (Zeller)

Forewing 6.0 to 6.5 mm long, mid-area olive brown. Adults captured June 19–August 10. MI, MN. Larva feeds in rolled leaves of *Ostrya virginiana, Diospyros virginiana*. Syst: Clarke (1973). Biol: Marshall and Musgrave (1937). (9 N, 2 Gm, 2 Gf, T)

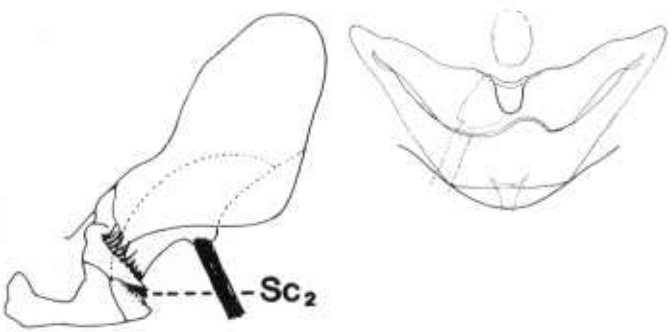
Genus *Zomaria*

Both sexes. Thorax with posterior tuft. Forewing termen convex, R_1 originating well before middle of discal cell, R_2 originating equidistant between R_3 and R_1, upper internal vein of discal cell originating between R_2 and R_3, R_3 and R_4 not approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 connate.

Male. Hindwing inner margin unmodified. Hindmost tibia without dilated or tufted scaling, without basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Uncus developed; socius present on underside of uncus; valval outer surface lacking spinelike setae, Sc_1 at or near base of cucullus, Sc_2 on a small projecting digitus; vesica without cornuti.

Female. Sternum 7 emarginate posteriorly. Ductus bursae sclerotized only near genital opening; corpus bursae with single scobinate signum that has earlike projections.

Comments. Three Nearctic species of *Zomaria* are known.



Zomaria interruptolineana (Fernald)

Forewing 5.0 to 7.0 mm long, dark markings brown or brownish black. Adults captured May 22–August 7. MI, WI, MN. Larva feeds in tied leaves of *Gaylussacia, Vaccinium*. Syst and Biol: Heinrich (1926). (21 N, 3 Gm, 2 Gf, T)

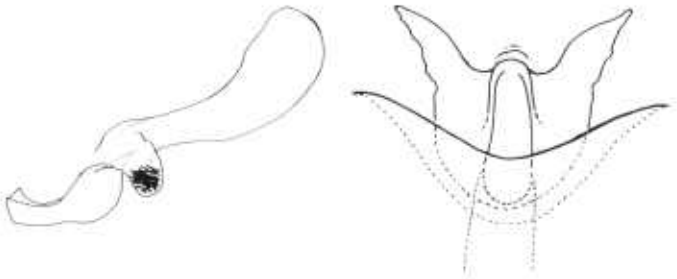
Genus *Apotomis*

Both sexes. Thorax with posterior tuft. Forewing termen straight or slightly convex, R_1 originating well before middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 not approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 connate.

Male. Hindwing inner margin modified into a sclerotized ridge. Hindmost tibia without dilated or tufted scaling, with basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Socius present; valval outer surface lacking spinelike setae, Sc_1 on neck projection separate from cucullus; vesica with cornuti.

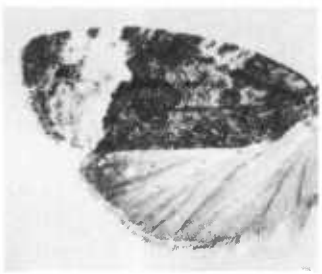
Female. Sternum 7 emarginate posteriorly. Ductus bursae sclerotized near middle; corpus bursae with two scobinate signa.

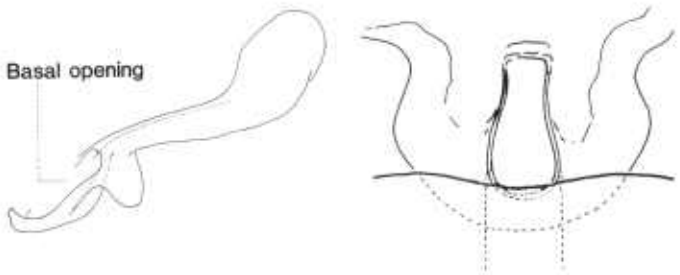
Comments. Nearly 20 Nearctic species of *Apotomis* are known. Among the species treated here, *A. capreana* and *A. infida* also occur in the Palearctic. The genus was reviewed by Adamski and Peters (1986).



Apotomis capreana (Hübner)

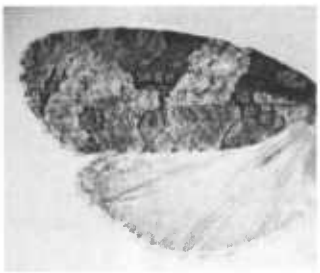
Forewing 6.5 to 9.0 mm long, dark areas and markings grayish brown or brownish black. Adults captured June 4–September 7. MI, WI, MN. Larva feeds on *Salix, Betula* leaves. Syst: Adamski and Peters (1986). Biol: Prentice (1966).
(33 N, 21 Gm, 8 Gf)





Apotomis funerea (Meyrick)

Forewing 8.5 to 10.0 mm long, dark areas grayish brown or brownish black. Adults captured July 4–September 2. MI, WI, MN. Larva feeds in rolled leaves of *Betula, Corylus*, others. Syst: Adamski and Peters (1986). Biol: Prentice (1966).
(76 N, 13 Gm, 19 Gf, T)

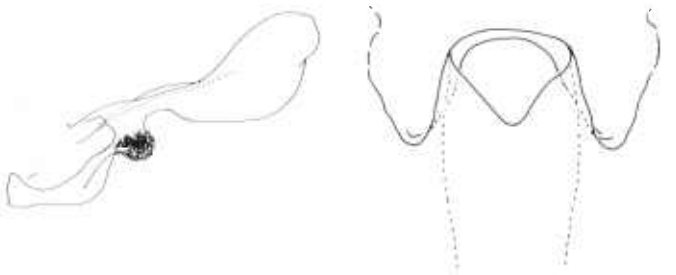


Apotomis deceptana (Kearfott)

Forewing 8.5 to 9.0 mm long, dark areas and markings grayish brown. Adults captured July 31–August 25. MI, MN. Larva feeds on *Salix, Populus*. Syst: Miller (1979a). Biol: Freeman (1957).
(4 N, 3 Gm, 1 Gf, T)

Apotomis removana (Kearfott)

Forewing 7.5 to 10.5 mm long, variable pattern; dark areas and markings brownish gray or brownish black. Common variants shown. Adults captured May 29–September 24. MI, WI, MN. Larva feeds in rolled leaves of *Populus, Salix*. Syst: Adamski and Peters (1986). Biol: Prentice (1966).
(86 N, 30 Gm, 16 Gf, T)



Apotomis infida (Heinrich)

Forewing 8.0 to 9.0 mm long, dark areas and markings grayish brown or brownish black. Adults captured June 20–July 14. MI, WI, MN. Larva feeds in rolled leaves of *Salix, Populus*. Syst: Adamski and Peters (1986). Biol: Prentice (1966).
(7 N, 7 Gm, T)

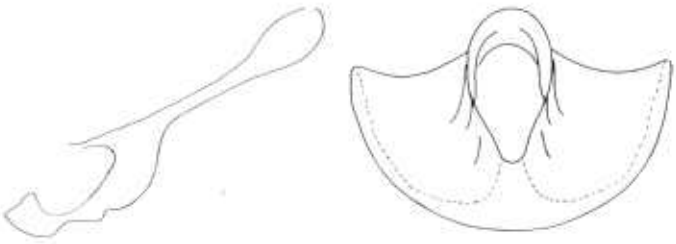
Genus *Pseudosciaphila*

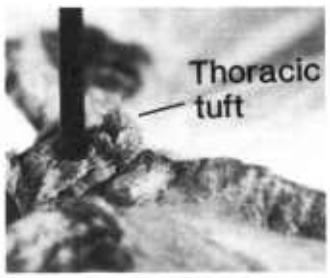
Both sexes. Thorax with posterior tuft. Forewing termen convex, R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 connate.

Male. Hindwing inner margin unmodified. Hindmost tibia without dilated or tufted scaling, without basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Uncus developed; valval outer surface with spinelike setae, Sc_2 not on a projecting digitus; vesica without cornuti.

Female. Sternum 7 emarginate posteriorly. Lamella antevaginalis developed, wider than lamella postvaginalis in anteroposterior orientation. Ductus bursae sclerotized less than one-third its length from genital opening; corpus bursae with two bladelike signa.

Comments. Only one Nearctic species of *Pseudosciaphila* is known. Additional species are known from the Palearctic.





Pseudosciaphila duplex (Walsingham)

Forewing 9.5 to 11.5 mm long, variable pattern; dark markings or areas yellowish brown, grayish yellowish brown, or brownish black. Nonmelanic and melanic variants shown. Adults captured May 21–July 24. MI, WI, MN. Univoltine. Larva feeds in rolled leaves of *Populus, Betula, Salix*. Syst: Heinrich (1926). Biol: McGregor (1967).
(122 N, 9 Gm, 5 Gf, T)

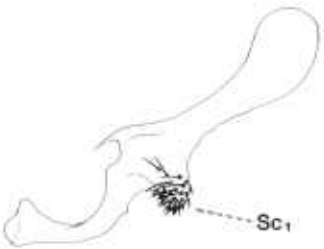
Genus *Orthotaenia*

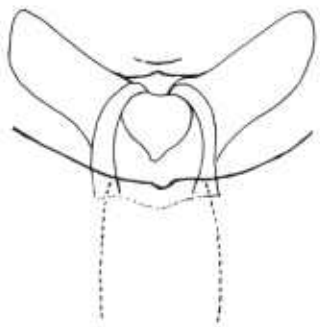
Both sexes. Thorax with posterior tuft. Forewing termen straight or convex, R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 not approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 connate.

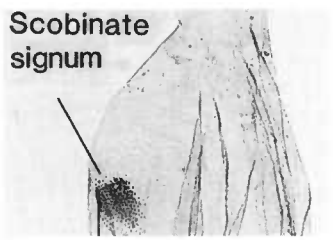
Male. Hindwing inner margin modified into a sclerotized thickening. Hindmost tibia without dilated or tufted scaling, with basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Socius present; valval outer surface lacking spinelike setae, Sc_1 on neck projection separate from cucullus; vesica with cornuti.

Female. Sternum 7 emarginate posteriorly. Ductus bursae sclerotized less than one-half its length from genital opening; corpus bursae with single scobinate signum.

Comments. *Orthotaenia* appears to be monotypic; *O. undulana* also occurs in the Palearctic.







Orthotaenia undulana (Denis and Schiffermüller)

Forewing 5.5 to 9.0 mm long, dark areas yellowish brown. Adults captured May 29–August 6. MI, WI, MN. Larva feeds in rolled leaves or terminals of *Populus, Salix, Betula*, others. Syst: Heinrich (1926). Biol: Prentice (1966).
(115 N, 23 Gm, 12 Gf)

Genus *Phaecasiophora*

Both sexes. Thorax with posterior tuft. Forewing termen convex, R_1 originating well before middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 not approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 connate.

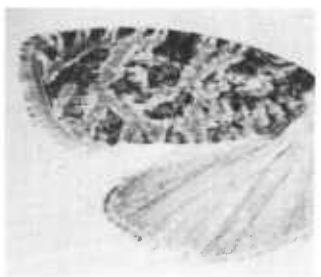
Male. Hindwing inner margin modified into a sclerotized ridge. Hindmost tibia with dilated and tufted scaling, with basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Uncus not developed; socius present; valval outer surface lacking spinelike setae, vesica with cornuti.

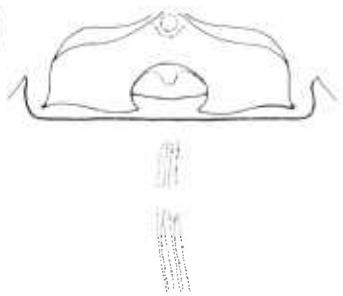
Female. Lamella antevaginalis undeveloped. Ductus bursae sclerotized two-thirds its length from genital opening; corpus bursae without signa.

Comments. Three Nearctic species of *Phaecasiophora* are known.

Phaecasiophora confixana (Walker)

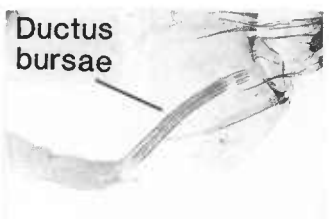
Forewing 8.0 to 9.5 mm long, variable pattern; dark markings or areas yellowish brown or brownish black. Nonmelanic and melanic variants shown. Adults captured May 13–July 13. MI. Syst: Heinrich (1926).
(6 N, 2 Gm, 3 Gf, T)





Phaecasiophora niveiguttana (Grote)

Forewing 6.5 to 9.0 mm long, dark markings yellowish brown. Adults captured May 14–August 15. MI, WI, MN. Larva feeds in rolled leaves of *Sassafras albidum*. Syst: Heinrich (1926). Biol: MacKay (1959).
(34 N, 3 Gm, 3 Gf, T)



Genus *Olethreutes*

Both sexes. Thorax with posterior tuft. Forewing termen convex or straight, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating before distal three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 connate.

Male. Hindmost tibia without dilated or tufted scaling, with basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Uncus developed; socius present.

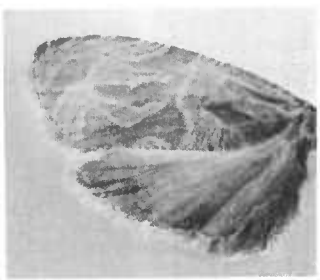
Female. Ductus bursae sclerotized only near genital opening; corpus bursae with or without single scobinate or thornlike signum.

Comments. Males of the former *Exartema* species are recognizable by the characteristic extended lobe on the hindwing anal margin. Such species constitute more than half the genus. Diakonoff (1973) cursorily treated them in an appendix to his treatment of South Asiatic *Olethreutes*.

More than 75 Nearctic species of *Olethreutes* are known. Among the species treated here, *O. cespitana* and *O. metallicana* occur in the Palearctic.

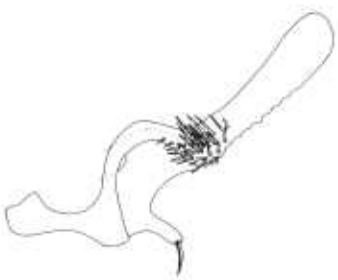
I was unable to confirm Fernekes' (1906) report of *O. exoletus* (Zeller) in the region.

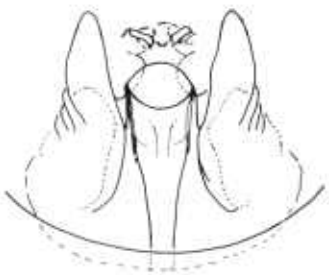
In some species groups, intraspecific variability is high and species limits are ill defined at present. One example is the *O. permundana* group (*clavana, melanomesa, nigrana, permundana, tiliana, viburnana*). Some specimens of such groups are not always easily identified to species.



Olethreutes nitidana (Clemens)

Forewing 8.0 mm long, pale areas orange yellow. Adult captured July 18. WI. Syst: Heinrich (1926).
(1 N, 1 Gm, T, photo specimen lectotype)

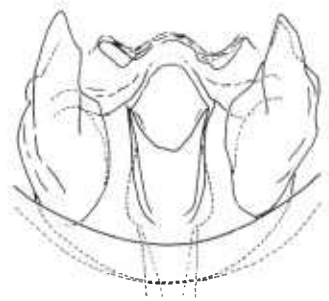




Olethreutes furfurana (McDunnough)

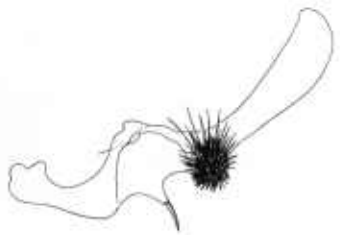
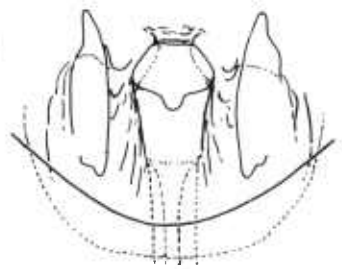
Forewing 6.0 to 7.5 mm long, dark areas grayish yellowish brown or brownish black. Adults captured May 30–September 2. MI, WI, MN. Larva feeds on *Rubus*. Syst and Biol: Miller (1979b).
(12 N, 8 Gm, 1 Gf, T)





Olethreutes comandrana (Clarke)

Forewing 7.0 mm long, pale areas of apical third orange. Adult captured July 1. MI. Larva feeds on *Comandra*. Syst and Biol: Clarke (1953).
(1 N, 1 Gf, T, photo specimen Putnam Co., IL)

Olethreutes olivaceana (Fernald)

Forewing 5.0 to 7.0 mm long, dark areas yellowish brown or olive brown. Adults captured June 11–August 24. MI. Larva feeds on *Fragaria*. Syst: Heinrich (1926). Biol: Vincent *et al.* (1985).
(7 N, 6 Gm, 1 Gf, T)



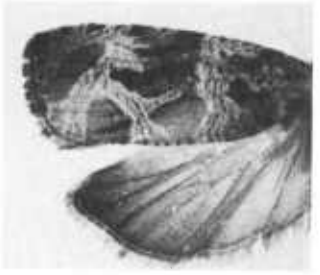
Olethreutes electrofuscus (Heinrich)

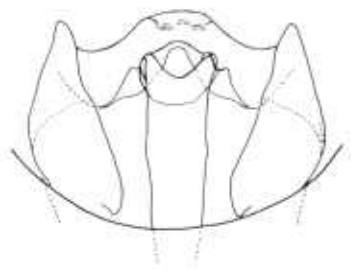
Forewing 6.5 to 8.0 mm long, dark areas yellowish brown. Adults captured July 12–August 2. MI. Larva feeds on *Myrica, Comptonia*. Syst: Heinrich (1926). Biol: Ferguson (1975).
(7 N, 4 Gm, 1 Gf, T)



Olethreutes footiana (Fernald)

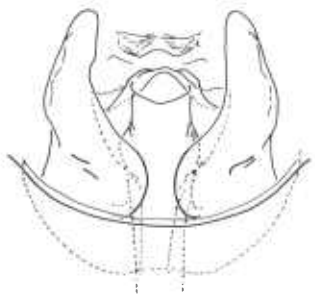
Forewing 8.5 mm long, dark areas yellowish brown or brownish black. Adults captured August 8–9. MI. Larva feeds on *Hamamelis, Quercus*. Syst: Heinrich (1926). Biol: Putman (1935).
(2 N, 2 Gf, T, photo specimen Essex Co., NJ)





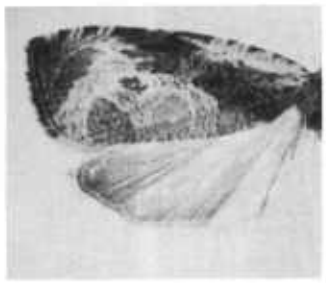
Olethreutes atrodentana (Fernald)

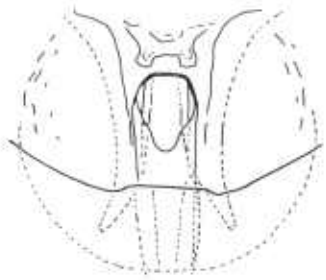
Forewing 7.0 to 9.5 mm long, dark areas yellowish brown or brownish black. Adults captured July 4–August 15. MI, WI, MN. Larva feeds in rolled *Quercus* leaves. Syst: Heinrich (1926). Biol: Prentice (1966).
(23 N, 6 Gm, 4 Gf, T)



Olethreutes punctana (Walsingham)

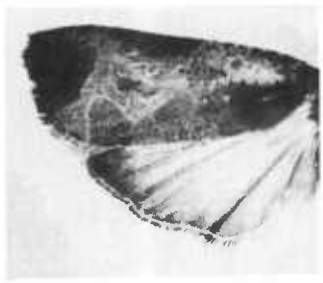
Forewing 7.5 to 9.0 mm long, dark markings brownish black. Adults captured June 18–August 1. MI, WI. Larva feeds in tied *Cornus* leaves. Syst: McDunnough (1935). Biol: McDunnough (1933).
(25 N, 6 Gm, 2 Gf, T)

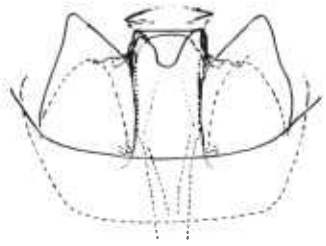




Olethreutes connectus (McDunnough)

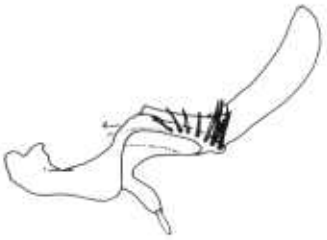
Forewing 7.0 to 9.0 mm long, dark markings brownish black. Adults captured June 13–August 30. MI. Larva feeds in folded *Cornus* leaves. Syst: McDunnough (1935). Biol: McDunnough (1933).
(26 N, 7 Gm, 4 Gf, T)

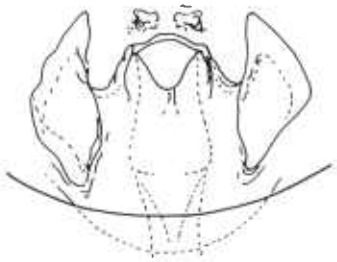




Olethreutes inornatana (Clemens)

Forewing 8.5 to 10.5 mm long, dark areas brownish black. Adults captured June 26–August 23. MI, WI, MN. Larva feeds on *Prunus, Cornus,* others. Syst: Heinrich (1926). Biol: Putman (1935).
(38 N, 6 Gm, 2 Gf, T)



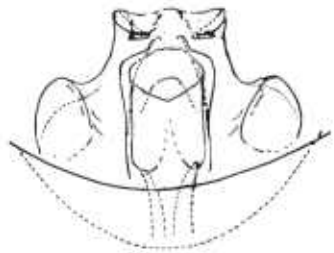


Olethreutes mysteriana Miller

Forewing 7.5 to 8.5 mm long, dark areas brownish black. Adults captured July 7–30. MI, WI. Larva feeds on tied *Ulmus, Celtis* leaves. Syst and Biol: Miller (1979b).
(6 N, 6 Gm, T, photo specimen holotype)

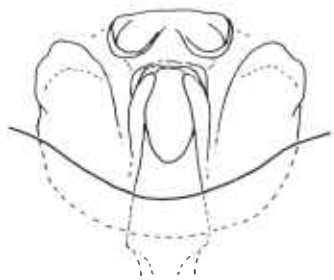
Olethreutes quadrifidus (Zeller)

Forewing 8.0 to 9.0 mm long, dark areas grayish yellowish brown or brownish black. Adults captured June 7–July 21. MI, WI. Larva feeds in rolled *Prunus, Cornus* leaves. Syst: Heinrich (1926). Biol: Prentice (1966).
(18 N, 6 Gm, 3 Gf, T)



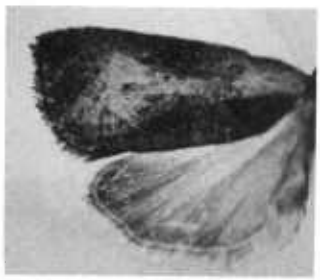
Olethreutes tiliana (Heinrich)

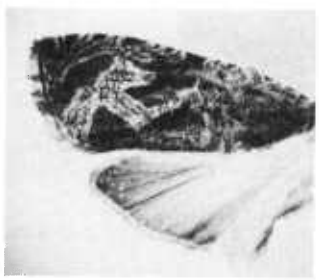
Forewing 8.0 to 10.0 mm long, pale areas grayish brown. Adults captured July 9–August 12. MI. Larva feeds in tied *Tilia* leaves. Syst and Biol: McDunnough (1942).
(13 N, 8 Gm, 1 Gf, T)

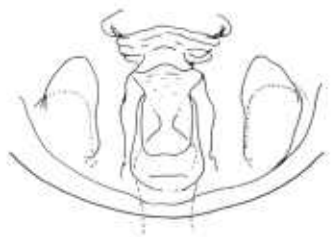


Olethreutes clavana (Walker)

Forewing 7.0 to 10.0 mm long, variable pattern; dark markings brown or yellowish brown. Common variants shown. Adults captured July 1–29. MI, WI. Larva feeds in tied *Corylus* leaves. Syst and Biol: Miller (1979b).
(23 N, 12 Gm, 5 Gf, T, bottom photo specimen Papineau Co., PQ)

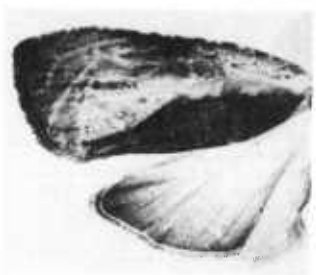


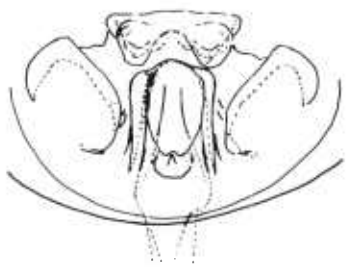




Olethreutes nigrana (Heinrich)

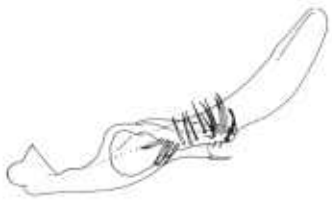
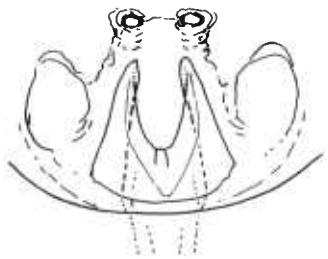
Forewing 9.5 to 10.0 mm long, variable pattern; dark markings brown or yellowish brown. Common variants shown. Adults captured July 15–August 4. MI, WI. Larva feeds on *Acer, Carya*. Syst and Biol: Miller (1979b).
(4 N, 4 Gm, T, bottom photo specimen Putnam Co., IL)





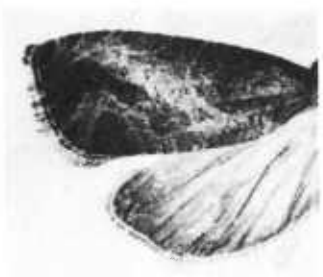
Olethreutes viburnana (McDunnough)

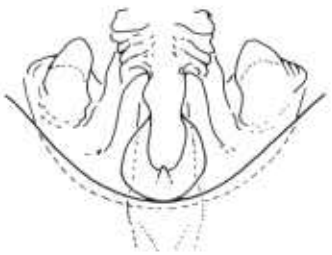
Forewing 8.0 to 9.5 mm long, dark markings grayish brown or brownish black. Adults captured July 10–19. MI, WI. Larva feeds on *Viburnum*. Syst: McDunnough (1935). Biol: Putman (1935).
(3 N, 1 Gm, 2 Gf, T)

Olethreutes merrickana (Kearfott)

Forewing 8.0 to 9.5 mm long, dark markings brown. Adults captured June 26–August 10. MI, WI. Larva feeds on *Ostrya virginiana, Carya*. Syst: McDunnough (1944). Biol: Prentice (1966).
(14 N, 8 Gm, 2 Gf, T)





Olethreutes hamameliana (McDunnough)

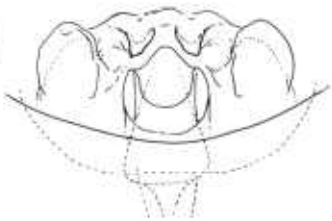
Forewing 8.0 to 9.0 mm long, pale areas orange yellow or yellowish brown. Adults captured June 6–July 15. MI, WI. Larva feeds on *Hamamelis*. Syst: McDunnough (1944). Biol: Ferguson (1975).
(22 N, 4 Gm, 5 Gf, T)



Olethreutes corylana (Fernald)

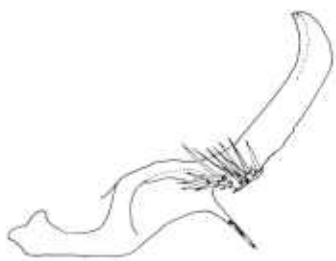
Forewing 7.0 to 8.5 mm long, dark markings yellowish brown. Adults captured June 9–August 19. MI, WI. Larva feeds on *Corylus*. Syst: Heinrich (1926). Biol: Prentice (1966).
(10 N, 6 Gm, 2 Gf, T)





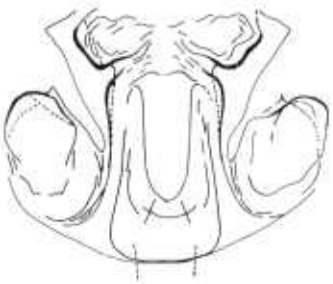
Olethreutes ochrosuffusana (Heinrich)

Forewing 10.5 mm long, pale areas yellowish brown. Adults captured July 9–15. MI. Larva feeds in folded *Aesculus* leaves. Syst and Biol: Braun (1951).
(2 N, 1 Gm, 1 Gf, T, photo specimen Boone Co., MO)


Olethreutes fagigemmeana (Chambers)

Forewing 7.5 mm long, dark areas brown. Adult captured August 5. MI. Larva feeds on *Fagus grandifolia, Ostrya virginiana*. Syst and Biol: Heinrich (1926).
(1 N, 1 Gf, T, photo specimen Hamilton Co., OH)

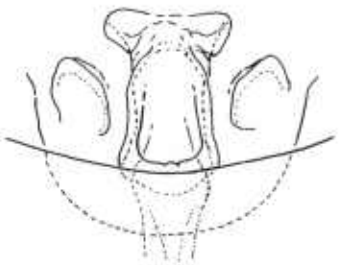


Olethreutes sericorana
(Walsingham)

Forewing 8.5 mm long, pale areas orange yellow. Adult captured July 19. WI, MN. Larva feeds on *Myrica*. Syst: Heinrich (1926). Biol: Schaffner (1959).
(2 N, 1 Gm, T)

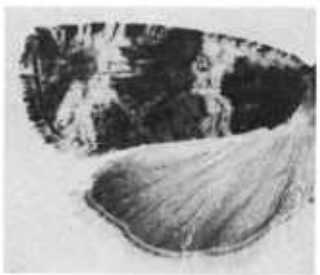
Olethreutes melanomesa
(Heinrich)

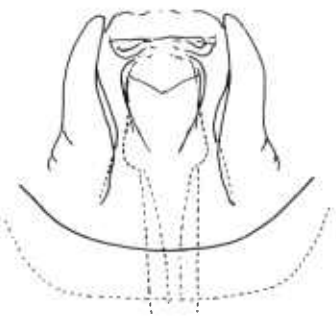
Forewing 7.5 to 8.5 mm long, dark areas brown. Adults captured July 7–August 8. MI. Larva feeds in *Kalmia* terminals. Syst: Heinrich (1926). Biol: McDunnough (1954).
(11 N, 5 Gm, T)



Olethreutes valdana
(McDunnough)

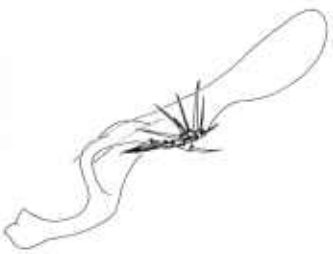
Forewing 6.5 to 8.5 mm long, dark areas yellowish brown. Adults captured June 7–August 17. MI, WI. Larva feeds in tied terminal leaves of *Spiraea, Myrica*. Syst and Biol: McDunnough (1956).
(31 N, 7 Gm, 11 Gf, T)

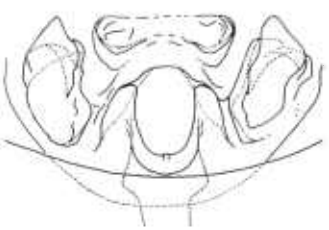




Olethreutes versicolorana
(Clemens)

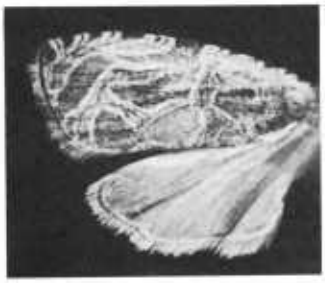
Forewing 7.0 to 8.5 mm long, dark areas yellowish brown. Adults captured July 1–August 3. MI, WI. Larva feeds on *Cornus*. Syst: Heinrich (1926). Biol: MacKay (1959).
(25 N, 10 Gm, 4 Gf, T)

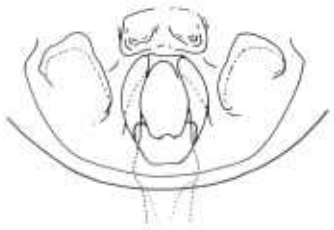




Olethreutes galevora
(McDunnough)

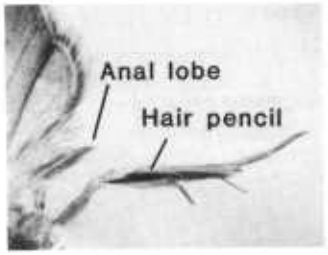
Forewing 7.0 to 8.5 mm long, dark areas brown or brownish black. Adults captured July 6–August 4. MI, WI. Larva feeds in tied terminal leaves of *Myrica*. Syst and Biol: McDunnough (1956).
(10 N, 7 Gm, 3 Gf, T)

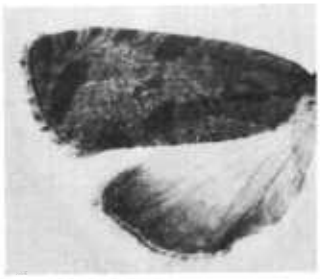


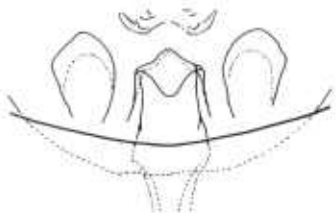


Olethreutes permundana (Clemens). Raspberry leafroller

Forewing 6.5 to 9.5 mm long, dark areas yellowish brown. Adults captured June 25–August 15. MI, WI. Larva feeds in leaf and flower buds, rolled leaves of *Rubus*, *Physocarpus opulifolius*. Syst: McDunnough (1956). Biol: Wheeler and Hoebeke (1985).
(66 N, 8 Gm, 2 Gf, T)





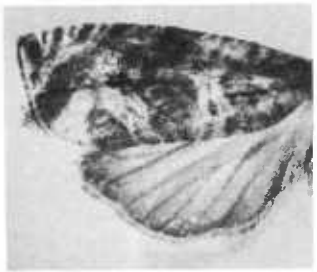


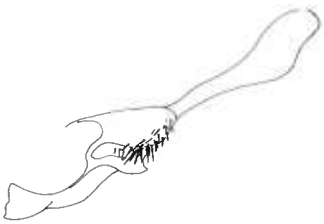
Olethreutes submissana (McDunnough)

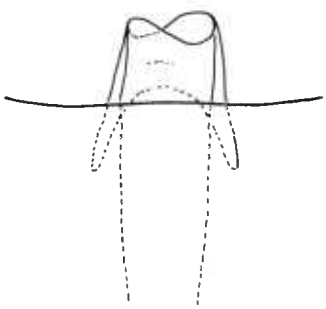
Forewing 7.0 to 8.0 mm long, dark markings brown. Adults captured July 17–August 16. MI, WI, MN. Larva feeds on *Alnus*. Syst: Heinrich (1926). Biol: Ferguson (1975).
(19 N, 2 Gm, 7 Gf, T)

Olethreutes malana (Fernald)

Forewing 7.0 mm long, dark markings grayish brown or brownish black. Adult captured August 11. MI, WI. Univoltine. Larva feeds in buds and rolled leaves of *Pyrus*. Syst: Heinrich (1926). Biol: Chapman and Lienk (1971).
(2 N, 1 Gf, T, photo specimen McHenry Co., IL)

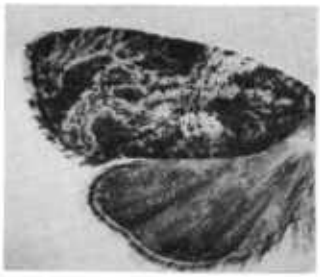


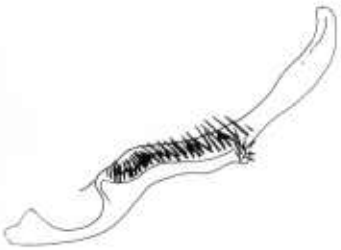


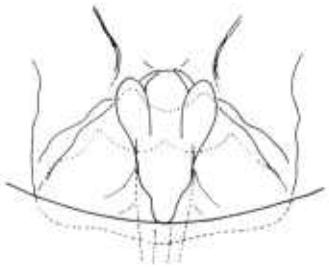


Olethreutes appendicea (Zeller)

Forewing 6.0 to 8.0 mm long, dark areas grayish yellowish brown. Adults captured June 11–August 31. MI, WI, MN. Larva feeds in rolled leaves of *Populus*, *Prunus*, *Amelanchier*, others. Syst: Heinrich (1926). Biol: Prentice (1966).
(48 N, 21 Gm, 6 Gf, T)

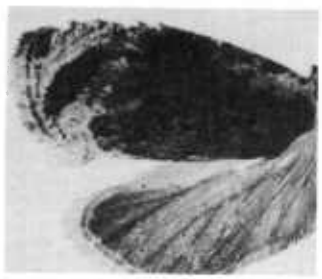


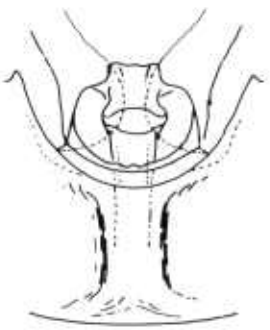




Olethreutes concinnana
(Clemens)

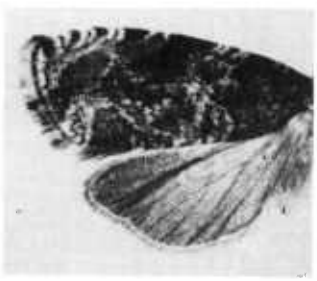
Forewing 6.0 to 7.0 mm long, variable pattern; dark markings and areas grayish brown or brownish black. Melanic and nonmelanic variants shown. Adults captured July 4–13. MI. Syst: Miller (1979b).
(4 N, 1 Gm, 2 Gf, T, top photo specimen Jefferson Co., KY)

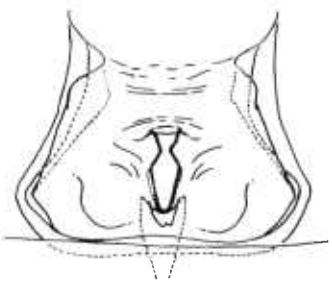




Olethreutes fasciatana
(Clemens)

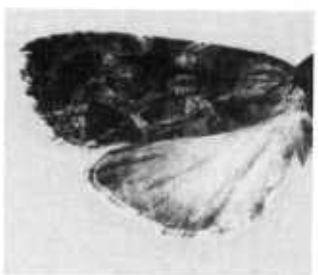
Forewing 5.0 to 7.5 mm long, dark areas brownish black. Adults captured May 26–August 9. MI, WI, MN. Larva feeds in rolled leaves of *Populus, Salix*. Syst: Heinrich (1926). Biol: Prentice (1966).
(67 N, 12 Gm, 8 Gf, T)

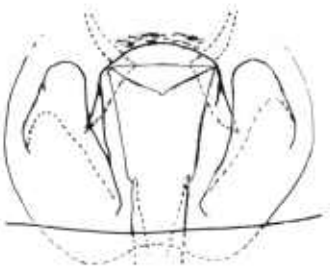




Olethreutes troglodana
(McDunnough)

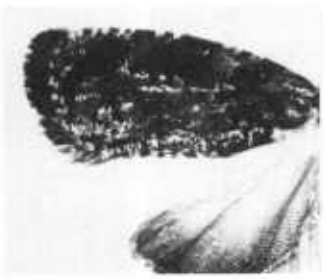
Forewing 6.5 to 7.0 mm long, dark markings yellowish brown. Adults captured June 21–23. WI. Syst: Miller (1985d).
(2 N, 2 Gm, T)

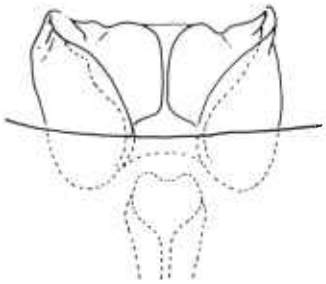




Olethreutes exaeresima
(Heinrich)

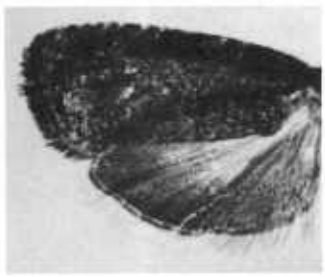
Forewing 9.0 mm long, dark markings brown. Adult captured July 23. MI, WI. Larva feeds on *Cornus*. Syst and Biol: Heinrich (1926).
(2 N, 2 Gm, T)

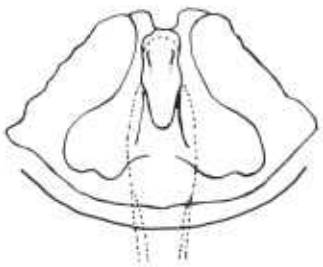




Olethreutes auricapitana (Walsingham)

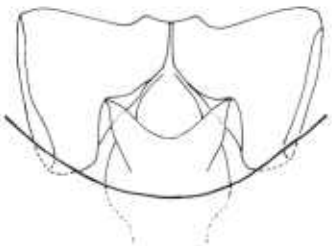
Forewing 5.5 mm long, dark areas brownish black. Adult captured between July 17–27. MI. Larva feeds on *Betula*. Syst and Biol: Heinrich (1926).
(1 N, 1 Gm, T, photo specimen Boone Co., MO)





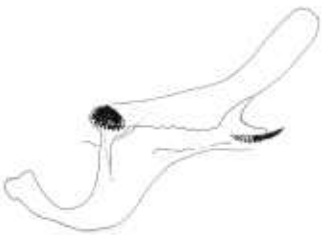
Olethreutes agilana (Clemens)

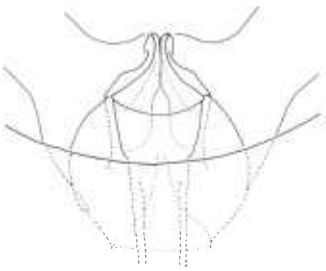
Forewing 4.5 to 7.0 mm long, dark areas brownish black. Adults captured May 23–July 9. MI, MN. Larva feeds in *Impatiens* stems. Syst: Miller (1985d). Biol: MacKay (1959).
(9 N, 5 Gm, 4 Gf, T, photo specimen Boone Co., MO)



Olethreutes albiciliana (Fernald)

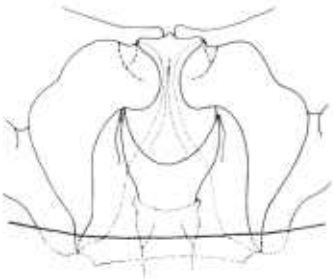
Forewing 5.0 to 6.5 mm long, dark markings brownish black. Adults captured June 12–July 9. MI, WI. Larva feeds in rolled leaves of *Spiraea, Alnus*. Syst: Heinrich (1926). Biol: Prentice (1966).
(9 N, 7 Gm, 2 Gf, T)





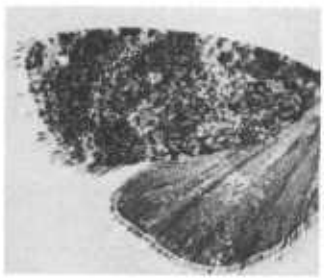
Olethreutes galaxana Kearfott

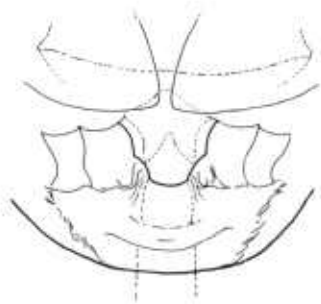
Forewing 7.5 mm long, pale areas orange yellow. Adult captured June 25. MN. Syst: Heinrich (1926).
(1 N, 1 Gf, T, photo specimen Slope Co., ND)



Olethreutes coruscana (Clemens)

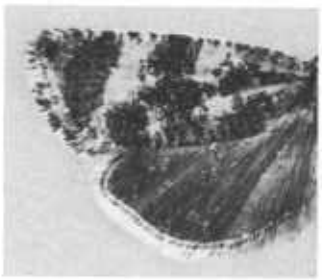
Forewing 7.0 to 10.5 mm long, pale areas orange. Adults captured May 30–August 22. MI, WI, MN. Syst: Miller (1985d).
(45 N, 20 Gm, 9 Gf, T)

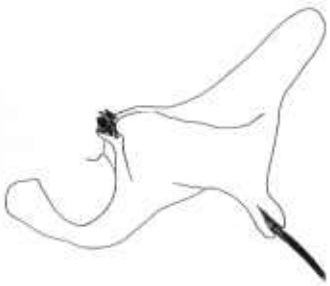


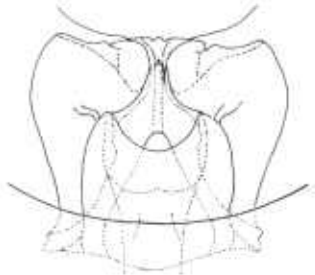


Olethreutes astrologana (Zeller)

Forewing 6.5 to 8.5 mm long, pale areas orange yellow. Adults captured May 30–August 15. MI, WI, MN. Syst: Heinrich (1926).
(56 N, 28 Gm, 9 Gf, T)

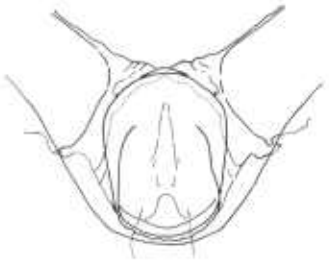






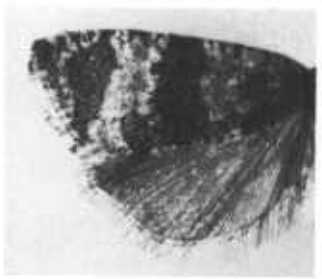
Olethreutes ferrolineana (Walker)

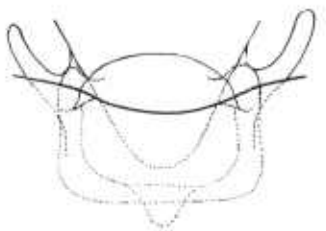
Forewing 7.0 to 9.5 mm long, pale areas orange. Adults captured May 24–July 18. MI, MN. Syst: Miller (1985d).
(15 N, 7 Gm, 5 Gf, T)



Olethreutes metallicana (Hübner)

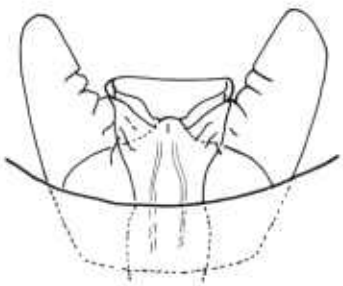
Forewing 8.0 to 8.5 mm long, variable pattern; pale areas orange yellow. Limits of variation shown. Adults captured July 5–13. MI, WI, MN. Syst: Miller (1985d).
(3 N, 3 Gf, top photo specimen *O. murina* lectotype, bottom, *O. major* lectotype)





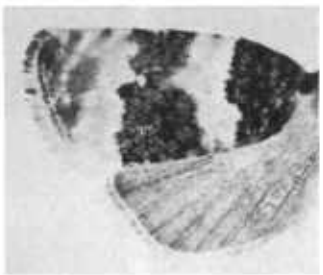
Olethreutes carolana (McDunnough)

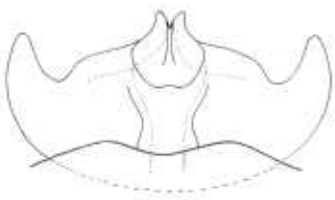
Forewing 6.0 to 7.0 mm long, dark markings yellowish brown or brownish black. Adults captured June 6–27. MI, MN. Syst: Heinrich (1926).
(5 N, 4 Gf, T)



Olethreutes glaciana (Möschler)

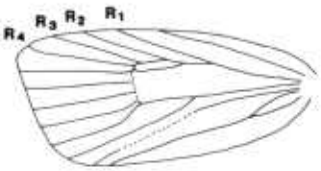
Forewing 5.0 to 8.0 mm long, dark markings yellowish brown or brownish black. Adults captured June 2–October 17. MI, WI, MN. Larva feeds in rolled leaves of *Betula, Populus, Acer,* others. Syst: Miller (1985d). Biol: Prentice (1966).
(41 N, 22 Gm, 6 Gf, T)

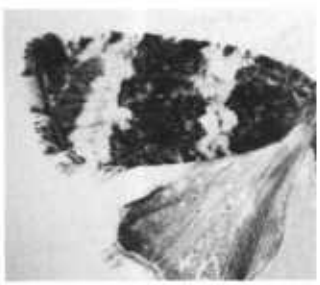


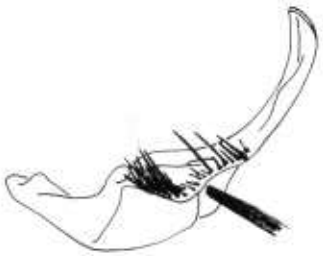


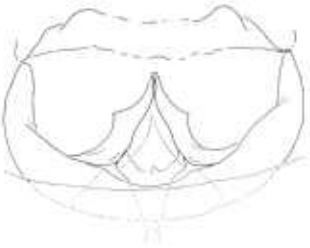
Olethreutes bipartitana (Clemens)

Forewing 6.0 to 9.0 mm long, dark markings grayish yellowish brown or brownish black. Adults captured May 23–September 6. MI, WI, MN. Larva feeds on *Spermolepis.* Syst and Biol: Heinrich (1926).
(73 N, 13 Gm, 11 Gf, T)



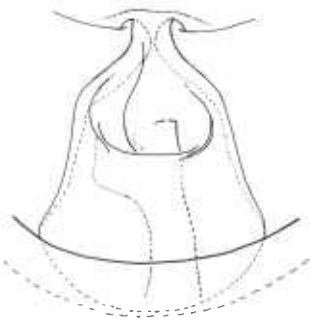






Olethreutes trinitana (McDunnough)

Forewing 7.0 to 7.5 mm long, dark areas and markings yellowish brown or brownish black. Adults captured July 2–28. MI, WI. Syst: McDunnough (1931).
(5 N, 1 Gm, 4 Gf, T)



Olethreutes cespitana (Hübner)

Forewing 5.5 to 8.0 mm long, dark markings yellowish brown. Adults captured May 26–September 16. MI, WI, MN. Bivoltine. Larva feeds in tied leaves of *Trifolium, Fragaria, Populus,* others. Syst: Heinrich (1926). Biol: Bennett (1961).
(331 N, 29 Gm, 9 Gf)

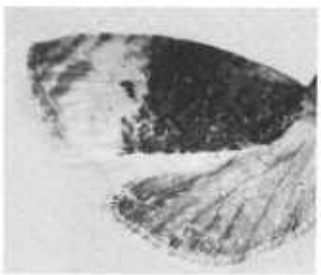
Genus *Hedya*

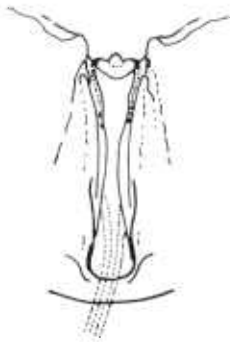
Both sexes. Thorax with posterior tuft. Forewing termen convex or straight, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 connate.

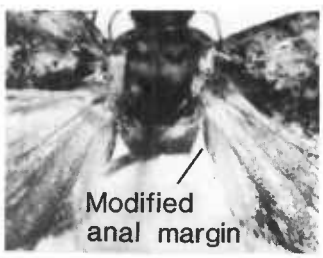
Male. Hindmost tibia without dilated or tufted scaling, with basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Uncus developed; socius present; valval Sc_2 not on a projecting digitus; vesica without cornuti.

Female. Ductus bursae sclerotized only near genital opening; corpus bursae with two thornlike or scobinate signa.

Comments. Five Nearctic species of *Hedya* are known. Among the species treated here, *H. ochroleucana* also occurs in the Palearctic. My attempts to confirm the presence of *H. nubiferana* (Haworth) in the region (Strickler and Whalon 1985) were unsuccessful.

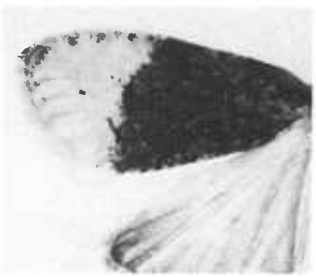


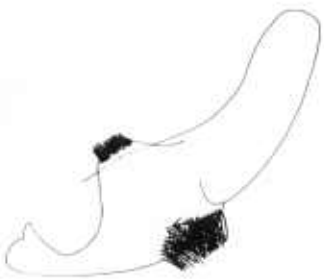


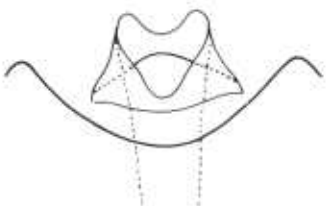


Hedya separatana (Kearfott)

Forewing 5.0 to 7.0 mm long, dark areas brownish black or grayish brown. Adults captured May 23–August 22. MI. Bivoltine. Larva feeds in rolled leaves of *Rosa, Rubus, Prunus,* others. Syst: Heinrich (1926). Biol: Chapman and Lienk (1971).
(16 N, 7 Gm, 3 Gf, T)

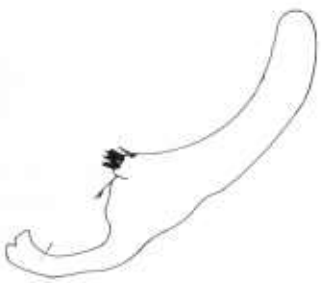


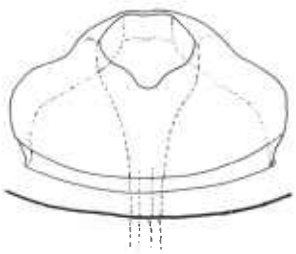




Hedya ochroleucana (Frölich)

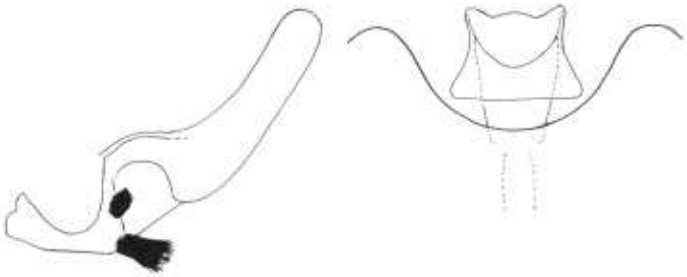
Forewing 7.5 to 9.5 mm long, dark areas brownish black or grayish brown. Adults captured June 2–September 6. MI, WI, MN. Larva feeds in rolled leaves of *Rosa, Pyrus.* Syst: Heinrich (1926). Biol: Prentice (1966).
(48 N, 25 Gm, 2 Gf)





Hedya chionosema (Zeller)

Forewing 6.5 to 8.0 mm long, dark markings grayish brown or brownish black. Adults captured June 14–August 14. MI, WI. Univoltine. Larva feeds on buds and leaves of *Pyrus, Crataegus, Amelanchier,* others. Syst: Heinrich (1926). Biol: Chapman and Lienk (1971).
(22 N, 3 Gm, 3 Gf)



Hedya cyanana (Murtfeldt)

Forewing 6.5 to 7.0 mm long, dark areas brownish black. Adults captured June 16–30. MI, MN. Larva feeds in rolled leaves of *Cirsium, Rosa*. Syst: Heinrich (1926). Biol: Marshall and Musgrave (1937).
(6 N, 4 Gm, 1 Gf, photo specimen Boone Co., MO)

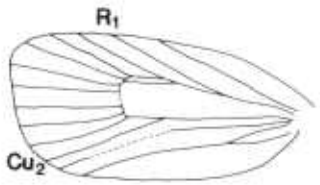
Genus *Evora*

Both sexes. Thorax with posterior tuft. Forewing termen straight, R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 not approximate, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating at or beyond distal three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 connate.

Male. Hindwing inner margin modified into a sclerotized ridge. Hindmost tibia without dilated or tufted scaling, with basal hair pencil. Abdominal segment 1 without paired ventrolateral papilliform scale pockets. Uncus developed; socius present; valval outer surface with spinelike setae, Sc_1 at or near base of cucullus, Sc_2 not on a projecting digitus; vesica without cornuti.

Female. Sternum 7 emarginate posteriorly. Lamella antevaginalis developed, not wider than lamella postvaginalis in anteroposterior orientation. Ductus bursae sclerotized only near genital opening; corpus bursae without signa.

Comments. *Evora* appears to be monotypic.



Evora hemidesma (Zeller)

Forewing 6.5 to 9.0 mm long, pale and dark areas brown. Adults captured June 10–September 2. MI, WI, MN. Multivoltine. Larva feeds in rolled *Spiraea* leaves. Syst: Heinrich (1926). Biol: Roberts (1966).
(62 N, 5 Gm, 8 Gf, T, photo specimen Page Co., IA)

Tribe Eucosmini

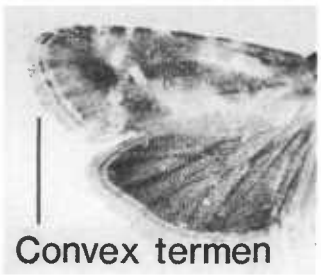
Genus *Rhyacionia*

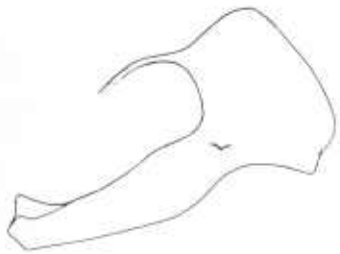
Both sexes. Forewing without raised scale tufts, termen straight or slightly convex, apex not falcate, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate, M_2 and M_3 connate, M_2, M_3, and Cu_1 remote at termen. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; valva not divided, without rudimentary clasper, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin.

Female. Sternum 7 neither inflected nor overlapping ostium bursae. Lamella antevaginalis not conical, lamella postvaginalis present. Ductus bursae sclerotized one-third or less its length from genital opening; corpus bursae without sclerotized sides, with two thornlike signa or without signa.

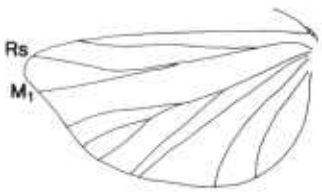
Comments. More than 20 Nearctic species of *Rhyacionia* are known. Among the species treated here, *R. buoliana* also occurs in the Palearctic. It was introduced to the Nearctic before 1914. Powell and Miller (1978) reviewed the species of *Rhyacionia*.

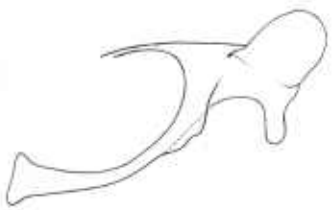


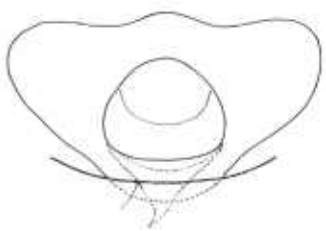


Rhyacionia buoliana (Denis and Schiffermüller). European pine shoot moth

Forewing 7.5 to 11.0 mm long, dark areas orange. Adults captured June 3–July 23. MI, WI. Univoltine. Larva feeds in *Pinus* terminals. Syst: Powell and Miller (1978). Biol: Miller (1967). (158 N, 3 Gm, 4 Gf)

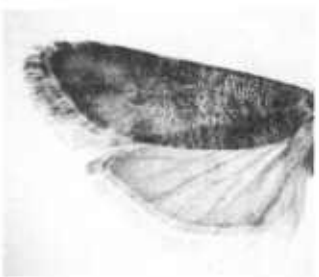


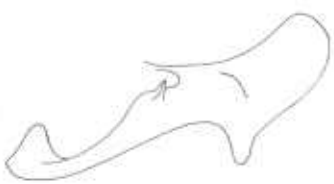


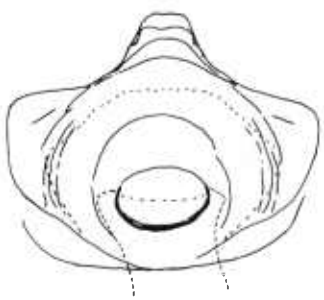


Rhyacionia adana Heinrich

Forewing 5.5 to 7.0 mm long, pale apical areas orange. No capture dates; all adults reared. MI. Univoltine. Larva feeds in terminals of *Pinus resinosa, P. banksiana, P. sylvestris.* Syst: Powell and Miller (1978). Biol: Martin (1960).
(12 N, 4 Gm, 3 Gf, T)

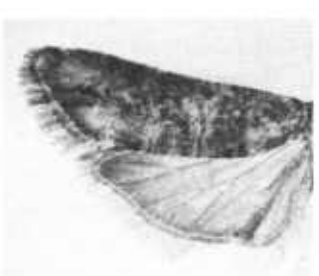






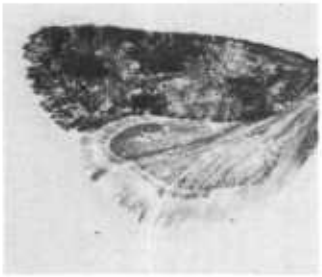
Rhyacionia busckana Heinrich

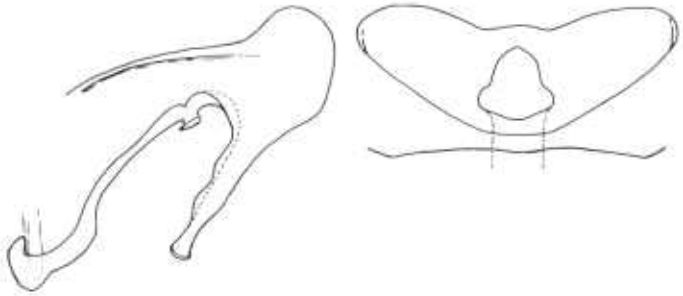
Forewing 8.0 mm long, pale apical areas orange. Male antennal pecten subequal in length to antennal segments. Adult captured May 25. MI. Larva feeds in terminals of *Pinus resinosa, P. sylvestris.* Syst and Biol: Miller (1985b).
(1 N, 1 Gf, T, photo specimen Simcoe Co., ON)



Rhyacionia granti Miller

Forewing 6.0 to 8.0 mm long, pale apical areas orange. Male antennal pecten twice or more as long as antennal segments. Adults captured April 28–May 25. MI, WI. Larva feeds in *Pinus banksiana* terminals. Syst and Biol: Miller (1985b).
(13N, 3 Gm, 6 Gf, T, photo specimen Dauphin Co., PA)





Rhyacionia sonia Miller

Forewing 6.5 mm long, pale areas orange. Adult captured May 25. MI. Larva feeds in *Pinus banksiana* terminals. Syst: Powell and Miller (1978). Biol: McDowell and Wong (1962).
(1 N, 1 Gm, T, photo specimen holotype)

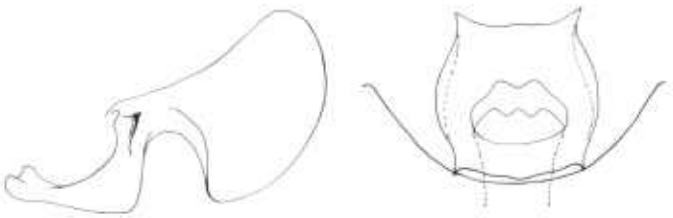
Genus *Retinia*

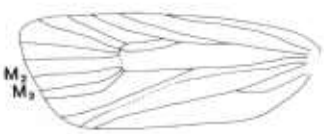
Both sexes. Forewing without raised scale tufts, termen straight or slightly concave, apex not falcate, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate or approximate, M_2 and M_3 connate, M_2, M_3, and Cu_1 remote at termen. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

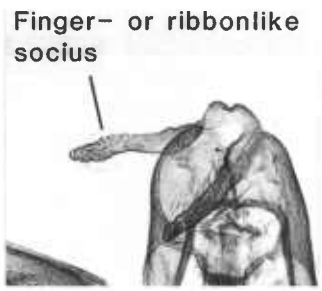
Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; socius present; valva not divided, rudimentary clasper present, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin.

Female. Sternum 7 neither inflected nor overlapping ostium bursae. Ductus bursae sclerotized less than three-fourths its length from genital opening; corpus bursae without sclerotized sides, with two thorn- or finlike signa.

Comments. Fifteen Nearctic species of *Retinia* are known. The validity of the name *Retinia* for this genus (formerly *Petrova*) was documented by Leraut (1978). The pitch-blister-making group of *Retinia* was reviewed by Miller (1978b).

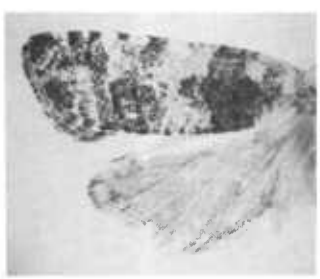


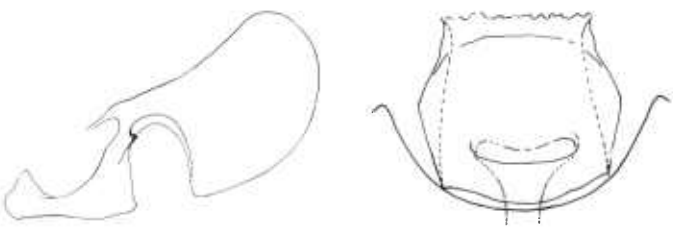




Retinia albicapitana (Busck). Northern pitch twig moth

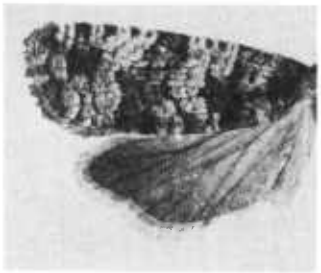
Forewing 5.0 to 10.5 mm long, dark areas orange or brown. Adults captured April 28–July 27. MI, WI, MN. Semivoltine. Larva feeds on *Pinus* terminals and twigs beneath pitch blister. Syst: Miller (1978b). Biol: Turnock (1953).
(154 N, 5 Gm, 7 Gf, T)





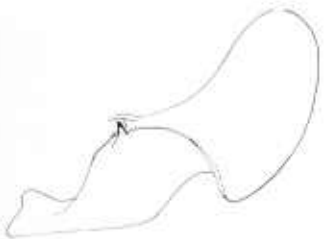
Retinia metallica (Busck)

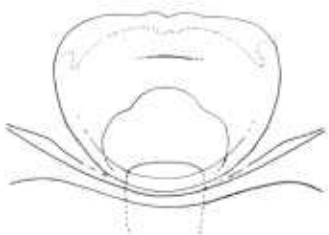
Forewing 7.0 to 10.0 mm long, dark areas brown or purplish blue. No capture dates; all adults reared. MN. Univoltine. Larva feeds on *Pinus* terminals beneath pitch blister. Syst and Biol: Miller (1978b).
(30 N, 2 Gm, 2 Gf, T)



Retinia mafica (Miller)

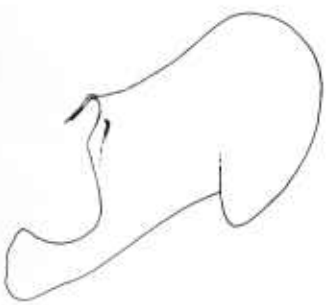
Forewing 6.5 to 8.0 mm long, dark areas grayish brown or brownish black. Adults captured May 7–June 13. MI, WI. Larva feeds on *Pinus*. Syst and Biol: Miller (1978b).
(10 N, 6 Gm, 1 Gf, T, photo specimen holotype)

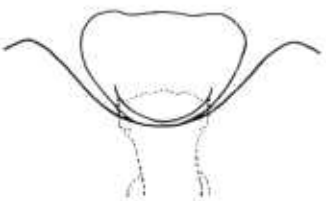




Retinia gemistrigulana (Kearfott)

Forewing 7.5 to 10.5 mm long, dark markings grayish yellowish brown. Adults captured July 1–August 7. MI, WI. Syst: Heinrich (1923b).
(24 N, 14 Gm, 2 Gf, T)





Retinia pallipennis (McDunnough)

Forewing 6.5 to 8.5 mm long, dark markings brown or brownish orange. Adults captured May 10–30. MI, WI, MN. Larva feeds in *Pinus* buds. Syst: McDunnough (1938). Biol: Butcher and Hodson (1949).
(10 N, 6 Gm, 2 Gf, T)

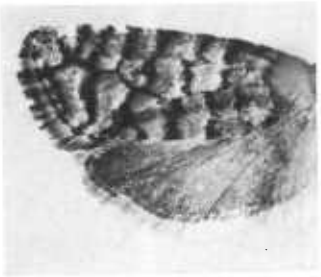
Genus *Barbara*

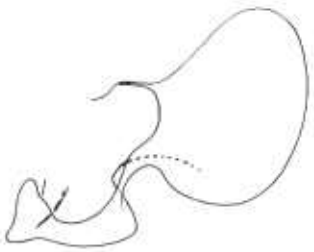
Both sexes. Forewing without raised scale tufts, termen straight or slightly concave, apex not falcate, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate or approximate, M_2 and M_3 connate, M_2, M_3, and Cu_1 remote at termen, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

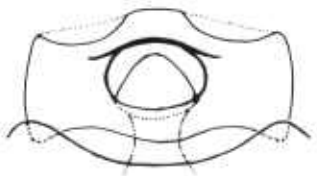
Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; socius present; valva not divided, without rudimentary clasper, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin.

Female. Sternum 7 not deeply emarginate, neither inflected nor overlapping ostium bursae. Ductus bursae sclerotized one-half its length from genital opening; corpus bursae without sclerotized sides, with two thorn- or finlike signa.

Comments. Three Nearctic species of *Barbara* are known.







Barbara mappana Freeman

Forewing 7.0 mm long, pale areas brownish gray. Adults captured June 25. WI. Larva feeds in cones of *Abies balsamea, Picea.* Syst: Freeman (1941). Biol: Prentice (1966). (4 N, 1 Gm, 1 Gf, T)

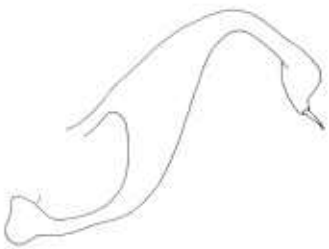
Genus *Spilonota*

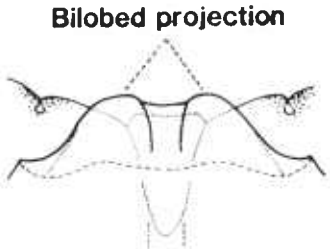
Both sexes. Forewing without raised scale tufts, termen straight or slightly concave, apex not falcate, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 connate, M_2 and M_3 approximate at base, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

Male. Antenna notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; socius present; valva not divided, without rudimentary clasper, outer surface lacking spinelike setae, with a thin spinelike seta on cucullus at lower margin.

Female. Sternum 7 inflected and overlapping ostium bursae, with median bilobed projection. Ductus bursae sclerotized near middle; corpus bursae without sclerotized sides, with single thornlike signum.

Comments. Two Nearctic species of *Spilonota* are known; both also occur in the Palearctic. *Spilonota ocellana* was introduced to the Nearctic before 1840.





Spilonota ocellana (Denis and Schiffermüller). Eyespotted bud moth

Forewing 6.0 to 7.5 mm long, dark areas and markings grayish yellowish brown or brownish black. Adults captured June 8–September 1. MI, WI, MN. Univoltine. Larva feeds on buds, flowers, leaves of *Pyrus malus, Prunus, Rubus,* others. Syst: Heinrich (1923b). Biol: Oatman *et al.* (1962). (98 N, 4 Gm, 5 Gf)

Genus *Phaneta*

Both sexes. Forewing without raised scale tufts, termen straight or slightly concave, apex not falcate, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate, M_2 and M_3 separate, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked or united.

Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; socius finger- or

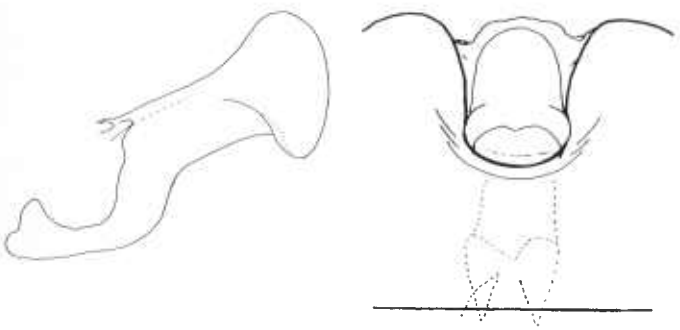
ribbonlike, not heavily sclerotized; valva not divided, without rudimentary clasper, sacculus not densely clothed with spinelike setae, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin.

Female. Sternum 7 deeply emarginate around ostium bursae, neither inflected nor overlapping ostium bursae. Lamella antevaginalis not conical, lamella postvaginalis not recessed, ostium bursae not elongate. Ductus bursae sclerotized near middle; corpus bursae without sclerotized sides, with dual thorn- or finlike signa.

Comments. Among the species treated here, all except *Phaneta ornatula* have forewing R_2 originating nearer R_3 than R_1.

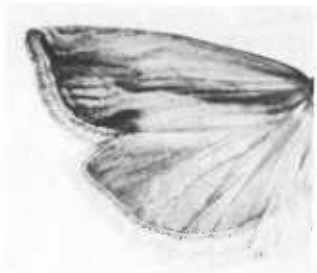
Nearly 100 Nearctic species of *Phaneta* are known.

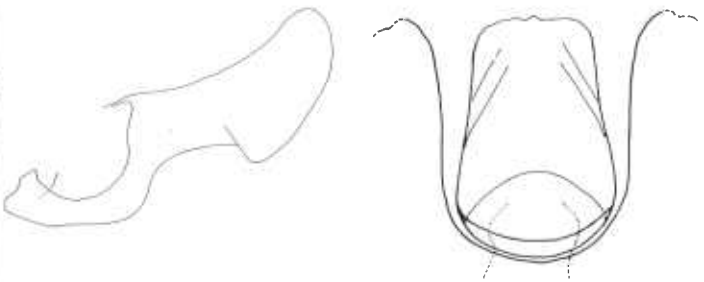
In the *P. radiatana* species group (*radiatana, essexana, awemeana, umbrastriana, formosana*), intraspecific variability is high and species limits are ill defined at present. Some specimens of this group are not easily identified to species. Members of the group are treated here according to the synopsis given by Miller (1983a).



Phaneta radiatana (Walsingham)

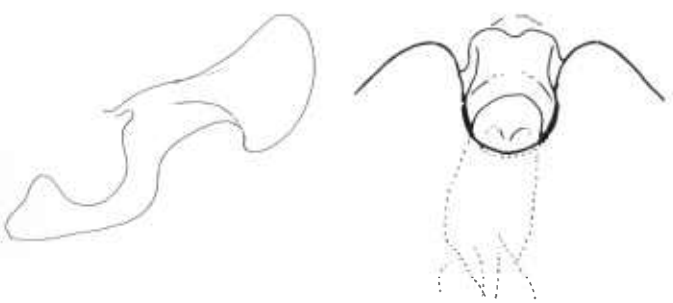
Forewing 9.0 to 11.5 mm long, pale areas in male pale orange yellow, in female yellowish brown. Adults captured May 20–June 24. MI. Larva feeds in *Solidago* stems. Syst and Biol: Heinrich (1923b).
(22 N, 4 Gm, 1 Gf, T)





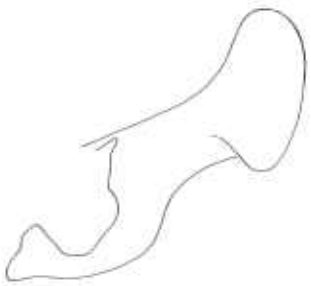
Phaneta essexana (Kearfott)

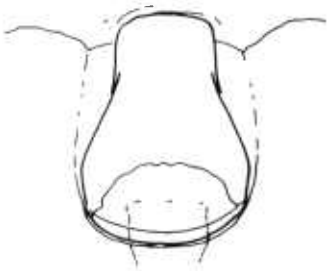
Forewing 9.5 to 11.5 mm long, pale areas in male pale orange yellow, in female yellowish brown. Adults captured May 13–June 3. MI. Larva feeds in *Aster* stems. Syst: Heinrich (1923b). Biol: MacKay (1962).
(8 N, 3 Gm, T)



Phaneta awemeana (Kearfott)

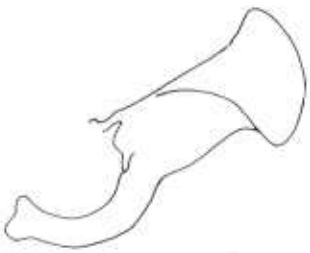
Forewing 8.0 to 10.0 mm long, pale areas in male pale orange yellow, in female yellowish brown. Adults captured May 5–June 29. MI, WI, MN. Syst: Heinrich (1923b).
(33 N, 5 Gm, 1 Gf, T)





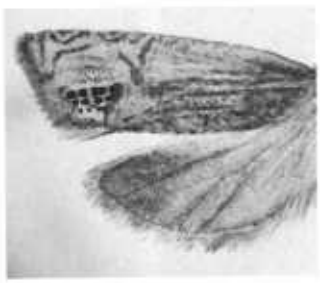
Phaneta umbrastriana (Kearfott)

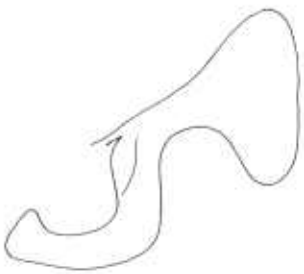
Forewing 7.5 to 10.0 mm long, pale areas in male pale orange yellow, in female yellowish brown. Adults captured May 11–June 23. MI, WI, MN. Syst: Miller (1983a).
(49 N, 14 Gm, 1 Gf, T)

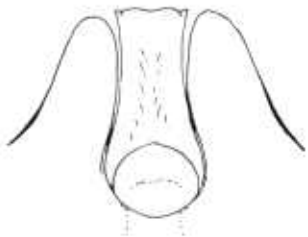


Phaneta formosana (Clemens)

Forewing 8.0 to 9.5 mm long, dark areas brown. Adults captured May 30–July 5. MI, WI. Larva feeds in *Solidago* terminals. Syst: Heinrich (1923b). Biol: Putman (1942).
(26 N, 3 Gm, 6 Gf, T)

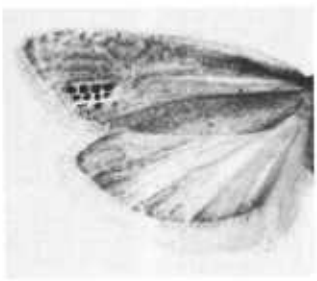






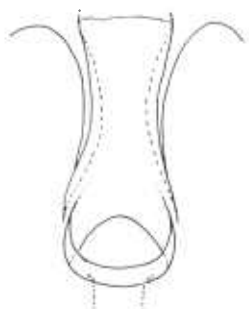
Phaneta autumnana (McDunnough)

Forewing 7.0 to 8.5 mm long, medium pale areas orange yellow. Adults captured August 28–October 13. MI, WI. Syst: Miller (1971).
(23 N, 19 Gm, 1 Gf, T)



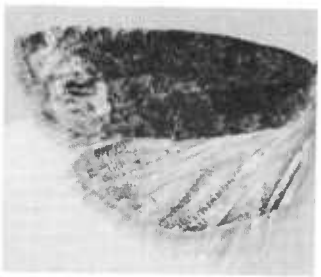
Phaneta verna Miller

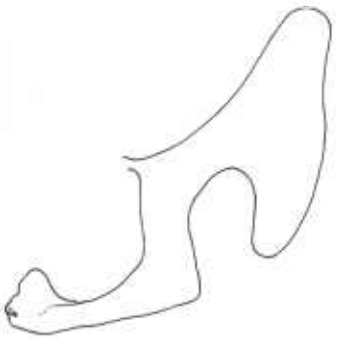
Forewing 7.0 to 8.0 mm long, medium pale areas orange yellow. Adults captured May 15–29. MI. Syst: Miller (1971).
(8 N, 5 Gm, 1 Gf, T)

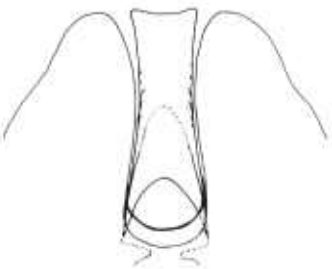


Phaneta raracana (Kearfott)

Forewing 5.5 to 6.5 mm long, dark areas brown. Adults captured July 22–August 11. MI. Larva feeds on *Solidago*. Syst and Biol: Heinrich (1923b).
(10 N, 3 Gm, 1 Gf, T)

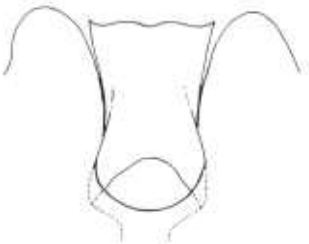






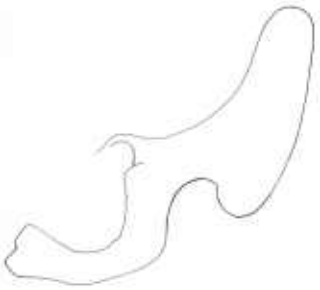
Phaneta ochroterminana (Kearfott)

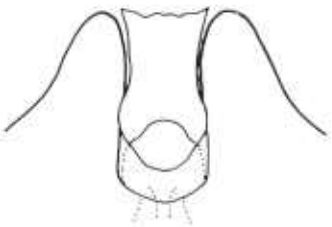
Forewing 5.0 to 6.5 mm long, dark areas bluish black. Adults captured July 12–August 29. MI, WI, MN. Larva feeds on *Solidago* flower heads. Syst: Heinrich (1923b). Biol: Putman (1942).
(24 N, 8 Gm, 2 Gf, T)



Phaneta marmontana (Kearfott)

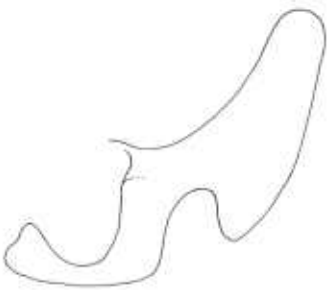
Forewing 6.0 to 7.5 mm long, dark areas of basal three-quarters grayish brown. Adults captured June 6–July 23. MI, WI. Syst: Heinrich (1923b).
(9 N, 5 Gm, 3 Gf, T)

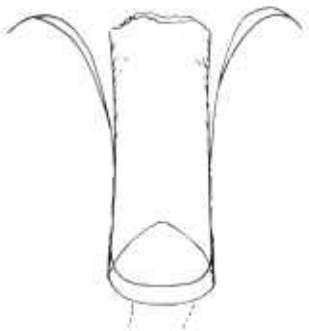




Phaneta tomonana (Kearfott)

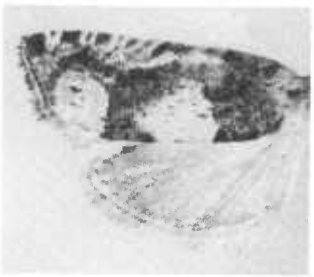
Forewing 5.5 to 7.5 mm long, dark markings brownish black. Adults captured August 12–September 7. MI, WI. Larva feeds on *Aster* flower heads. Syst: Heinrich (1923b). Biol: Putman (1942).
(19 N, 5 Gm, 2 Gf, T)

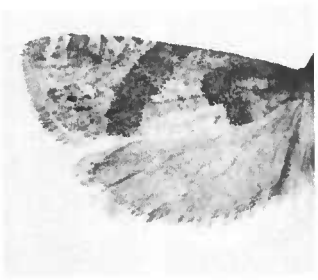


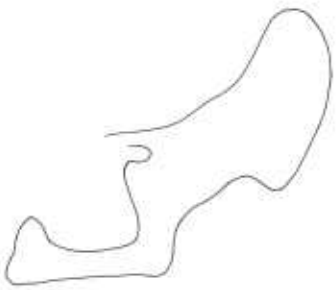


Phaneta parmatana (Clemens)

Forewing 5.0 to 7.0 mm long, size of pale dorsal spot variable; dark areas grayish brown or brownish black. Limits of variation shown. Adults captured May 20–September 8. MI, WI, MN. Larva feeds on *Aster* flower heads. Syst and Biol: Miller (1983a).
(85 N, 38 Gm, 8 Gf, T)







Female unknown

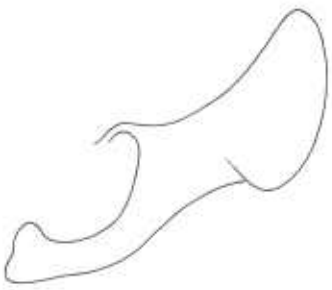
Phaneta modernana (McDunnough)

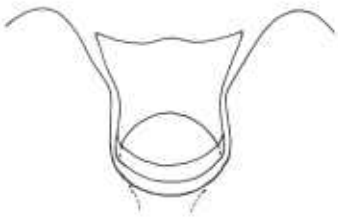
Forewing 9.5 mm long, pale areas grayish yellowish brown. Adult captured June 8. MI. Syst: McDunnough (1925a).
(1 N, 1 Gm, T)

Female unknown

Phaneta convergana (McDunnough)

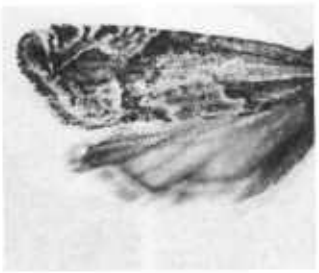
Forewing 7.5 mm long, pale areas light grayish yellowish brown. Adult captured May 21. MI. Syst: McDunnough (1925a).
(1 N, 1 Gm, T)

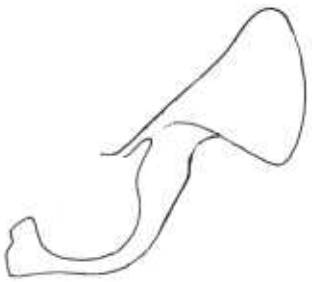


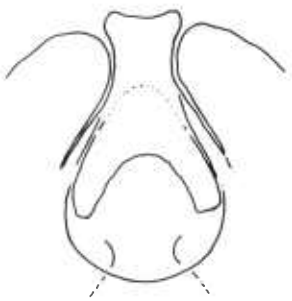


Phaneta ornatula (Heinrich)

Forewing 6.0 to 7.5 mm long, dark markings brownish black. Adults captured June 26–August 27. MI, WI, MN. Larva feeds in *Lactuca* flower heads. Syst: Heinrich (1924). Biol: Putman (1942).
(19 N, 5 Gm, 2 Gf, T)

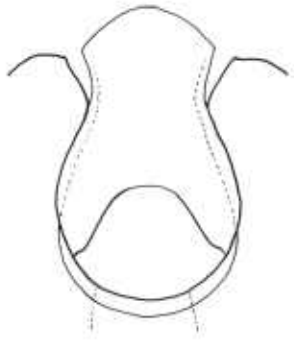






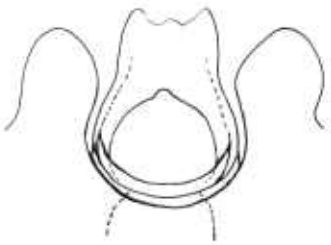
Phaneta vernalana (McDunnough)

Forewing 8.5 mm long, dark markings grayish yellowish brown. Adult captured May 24. MI. Syst: McDunnough (1942).
(1 N, 1 Gm, T)



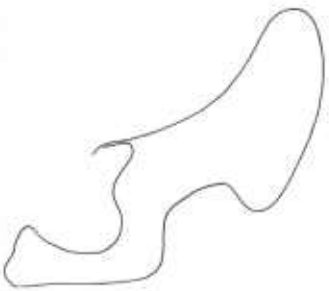
Phaneta tarandana (Möschler)

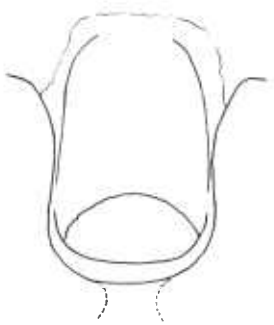
Forewing 10.5 to 11.5 mm long, pale areas pale yellow. Adults captured July 27–September 20. MI. Syst: Heinrich (1923b).
(3 N, 2 Gm, 1 Gf)



Phaneta clavana (Fernald)

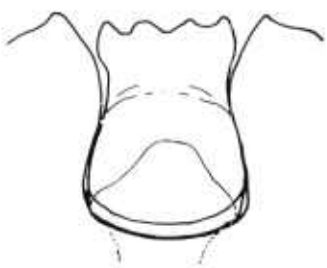
Forewing 6.5 to 8.0 mm long, dark markings yellowish brown or brownish black. Adults captured July 25–August 16. MI, MN. Syst: Heinrich (1923b).
(13 N, 3 Gm, 1 Gf, T)





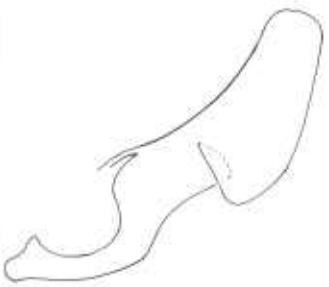
Phaneta argenticostana (Walsingham)

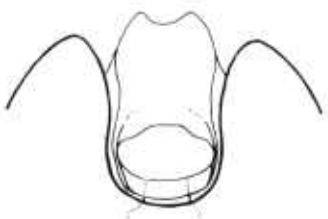
Forewing 8.0 to 10.5 mm long, dark areas and markings yellowish brown. Adults captured May 13–June 25. MI, MN. Larva feeds on *Artemisia*. Syst: Heinrich (1923b). Biol: Brown *et al.* (1983).
(28 N, 3 Gm, 2 Gf, T)



Phaneta dorsiatomana (Kearfott)

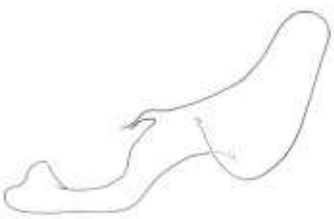
Forewing 9.0, medium light areas yellowish brown. No capture date. MN. Larva feeds on *Artemisia*. Syst: Heinrich (1923b). Biol: Brown *et al.* (1983).
(1 N, 1 Gm, T, photo specimen Emmons Co., ND)





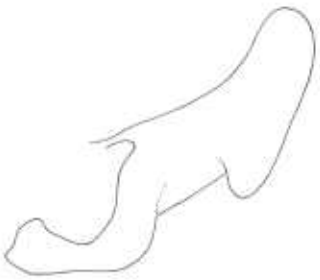
Phaneta striatana (Clemens)

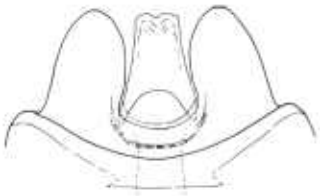
Forewing 6.0 to 8.0 mm long, dark areas and markings grayish brown. Adults captured May 20–August 8. MI, WI, MN. Syst: Heinrich (1923b).
(73 N, 5 Gm, 5 Gf, T)



Phaneta pallidicostana (Walsingham)

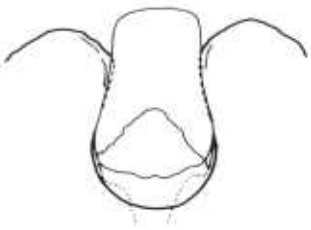
Forewing 7.0 to 8.5 mm long, white with yellowish white or yellowish gray markings. Adults captured June 22–July 24. MN. Syst: Heinrich (1923b).
(5 N, 2 Gm, 2 Gf, T)





Phaneta kiscana (Kearfott)

Forewing 6.0 mm long, dark areas and markings yellowish brown or brownish black. Adult captured June 29. MI. Syst: Heinrich (1923b).
(1 N, 1 Gm, T)

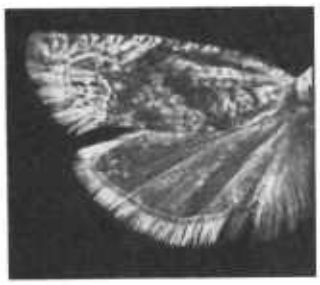


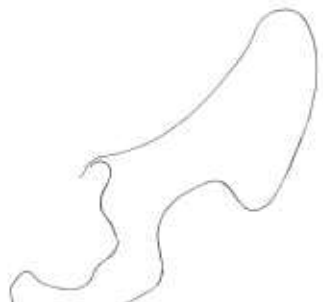
Phaneta montanana (Walsingham)

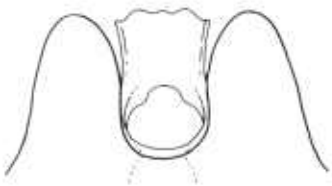
Forewing 7.5 to 10.5 mm long, pale areas pale orange yellow. Adults captured May 23–August 25. MI, MN. Larva feeds in *Artemisia* roots. Syst and Biol: Heinrich (1923b).
(8 N, 5 Gm, T)

Phaneta olivaceana (Riley)

Forewing 7.5 to 9.0 mm long, pale areas pale yellow. Adults captured June 24–August 3. MI. Larva feeds on *Solidago*. Syst: Heinrich (1923b).
(9 N, 2 Gm, 3 Gf, T)

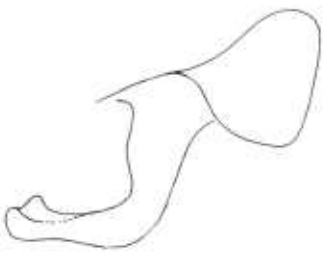


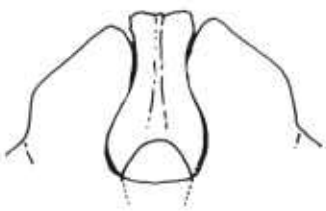




Phaneta ochrocephala (Walsingham)

Forewing 6.0 to 8.0 mm long, dark areas purplish gray or grayish purple. Adults captured July 31–August 22. MI, MN. Univoltine. Larva feeds in *Xanthium* seeds. Syst: Miller (1983a). Biol: Hare (1977).
(10 N, 4 Gm, 2 Gf, T)





Phaneta ambodaidaleia Miller

Forewing 9.5 to 10.0 mm long, grayish yellowish brown streaked with light yellowish brown. Adults captured April 26. MI. Syst: Miller (1983a).
(2 N, 2 Gm, T)

Genus *Eucosma*

Both sexes. Forewing without raised scale tufts, termen straight or concave, R_1 originating well before middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate, M_2 and M_3 separate. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked or united.

Male. Antenna not notched near base. Forewing with costal fold. Hindwing without upper-surface melanic sex scaling. Socius finger- or ribbonlike, not heavily sclerotized; valva not divided, sacculus not densely clothed with spinelike setae, without rudimentary clasper, outer surface lacking spinelike setae, with or without thin spinelike seta on cucullus at lower margin, midpoint of neck constriction at or beyond midpoint between valval base and apex.

Female. Sternum 7 neither inflected nor overlapping ostium bursae. Lamella antevaginalis not conical, lamella postvaginalis present. Ductus bursae sclerotized less than two-thirds its length from genital opening; corpus bursae with one or two thorn- or finlike signa.

Comments. Nearly 150 Nearctic species of *Eucosma* are known.

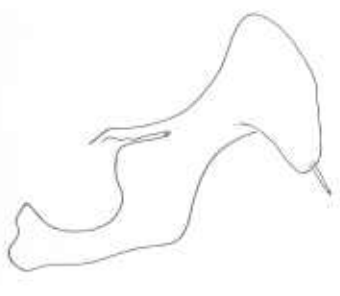
I was unable to confirm Fernekes' (1906) report of *E. canana* (Walsingham) in the region, or Prentice's (1966) report of *E. ridingsana* (Robinson) boring in *Pinus* branchlets.

Eucosma robinsonana (Grote)

Forewing 5.0 to 8.5 mm long, dark markings yellowish brown. Ovipositor with ventral extensions of papillae anales. Adults captured June 2–August 7. MI, MN. Syst: Heinrich (1923b). (43 N, 4 Gm, 5 Gf, T)

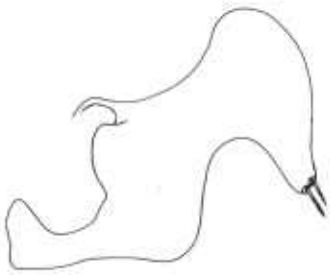
Eucosma ridingsana (Robinson)

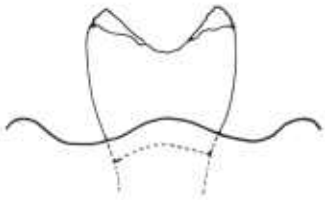
Forewing 8.0 mm long, dark markings yellowish brown. Adult captured Aug 13. MN. Larva feeds in *Gutierrezia* roots. Syst: Heinrich (1923b). Biol: Hetz and Werner (1979). (1 N, T, photo specimen lectotype)



Eucosma heathiana Kearfott

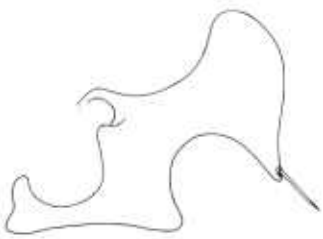
Forewing 8.5 mm long, dark areas and markings yellowish brown. Ovipositor with ventral extensions of papillae anales. Adults captured July 3–8. MI, MN. Syst: Heinrich (1923b). (2 N, 2 Gm, T)





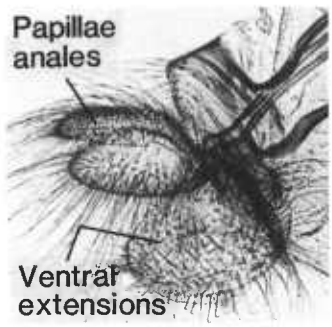
Eucosma morrisoni
(Walsingham)

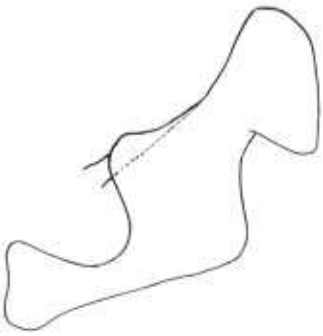
Forewing 7.0 to 9.5 mm long, dark markings yellowish brown or grayish yellowish brown. Ovipositor with ventral extensions of papillae anales. Adults captured July 14–August 18. MI, MN. Syst: Heinrich (1923b). (28 N, 6 Gm, 3 Gf, T)

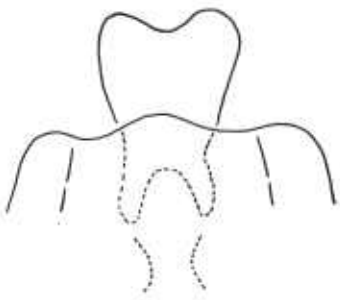


Eucosma agricolana
(Walsingham)

Forewing 6.5 to 9.5 mm long, dark markings grayish yellowish brown or brownish black. Ovipositor with ventral extensions of papillae anales. Adults captured May 23–July 17. MI, WI, MN. Larva feeds on *Artemisia*. Syst: Miller (1974). Biol: Brown *et al.* (1983). (103 N, 19 Gm, 5 Gf, T)

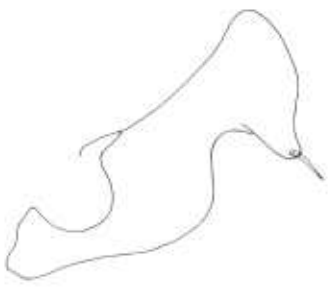


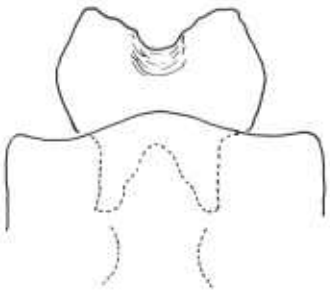




Eucosma smithiana
(Walsingham)

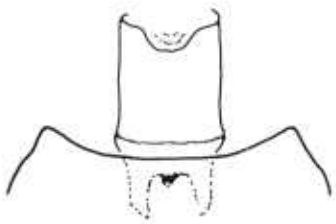
Forewing 7.0 to 8.5 mm long, pale areas yellowish white. Male uncus unevenly rounded in outline. Ovipositor with ventral extensions of papillae anales. Adults captured June 14–July 16. MN. Larva feeds in *Chrysanthemum* roots. Syst and Biol: Miller (1974). (10 N, 3 Gm, 6 Gf, T)





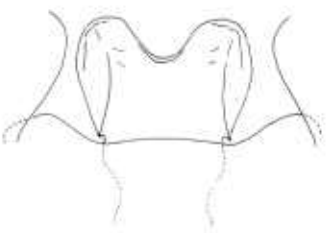
Eucosma barbara Miller

Forewing 7.0 to 8.5 mm long, pale areas yellowish white. Male uncus evenly rounded in outline. Ovipositor with ventral extensions of papillae anales. Adults captured July 3–August 8. MN. Syst: Miller (1974). (12 N, 5 Gm, 7 Gf, T)



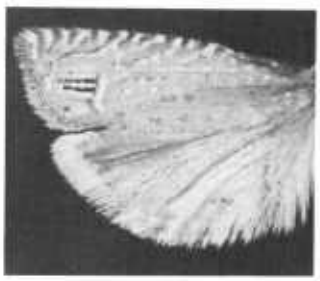
Eucosma rindgei Miller

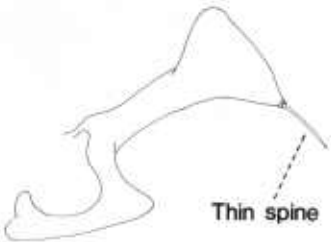
Forewing 7.0 to 8.0 mm long, dark markings blackish brown. Ovipositor with ventral extensions of papillae anales. Adults captured June 26–August 22. MN. Syst: Miller (1985c).
(17 N, 4 Gm, 4 Gf, T)

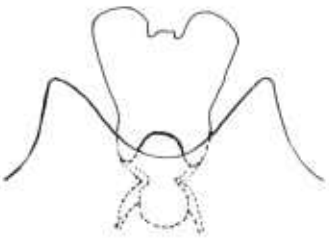


Eucosma vagana McDunnough

Forewing 7.0 to 9.0 mm long, dark areas and markings brown. Ovipositor with ventral extensions of papillae anales. Adults captured June 23–August 10. MI, WI, MN. Larva feeds in *Solidago* roots. Syst: Miller (1985c). Biol: Brown *et al.* (1983)
(25 N, 10 Gm, 5 Gf, T)

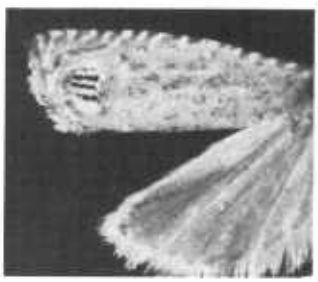


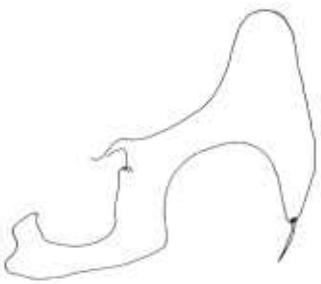


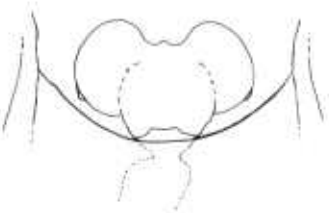


Eucosma albiguttana (Zeller)

Forewing 6.5 to 8.5 mm long, medium pale areas orange yellow. Ovipositor with ventral extensions of papillae anales. Adults captured July 11–15. MI, MN. Syst: Heinrich (1923b).
(12 N, 7 Gm, T)

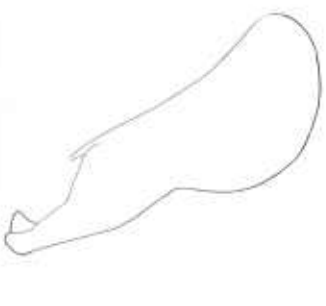


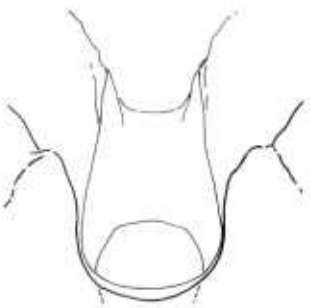




Eucosma graciliana Kearfott

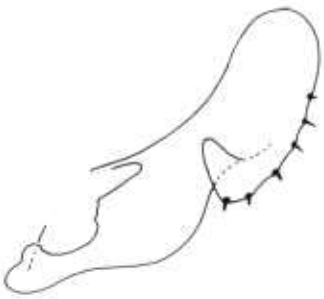
Forewing 5.0 to 6.5 mm long, medium pale areas orange yellow. Ovipositor with ventral extensions of papillae anales. Adults captured June 19–July 29. MI, WI, MN. Syst: Heinrich (1923b).
(7 N, 4 Gm, T)

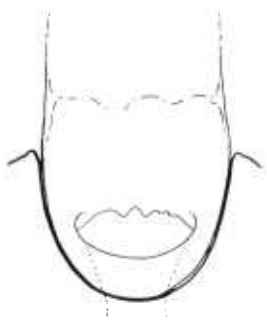




Eucosma maculatana (Walsingham)

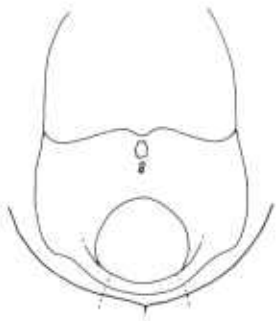
Forewing 8.0 to 8.5 mm long, dark markings brown. No capture dates. MN. Syst: Heinrich (1923b).
(2 N, 1 Gm, 1 Gf, T)





Eucosma gloriola Heinrich. Eastern pine shoot borer

Forewing 6.5 to 8.0 mm long, dark areas orange. Adults captured May 6–June 2. MI, WI, MN. Univoltine. Larva feeds in shoots of *Pinus, Picea, Pseudotsuga*. Syst and Biol: DeBoo *et al.* (1971).
(23 N, 6 Gm, 5 Gf, T)

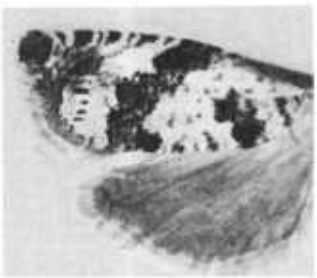


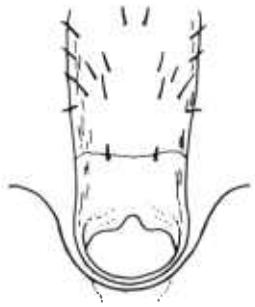
Eucosma monitorana Heinrich

Forewing 7.0 to 8.5 mm long, dark areas brown. Adults captured June 19–July 7. WI, MN. Univoltine. Larva feeds in cones of *Pinus resinosa, P. virginiana*. Syst: Powell (1968). Biol: Barras and Norris (1969).
(15 N, 6 Gm, 5 Gf, T)

Eucosma tocullionana Heinrich. White pine cone borer

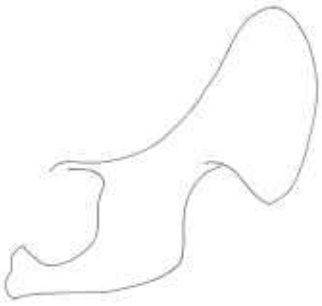
Forewing 5.5 to 9.0 mm long, dark areas and markings brown or brownish black. Adults captured May 31–July 14. MI, WI. Larva feeds in cones of *Pinus, Picea, Abies*. Syst and Biol: Powell (1968).
(34 N, 3 Gm, 8 Gf, T)





Eucosma matutina (Grote)

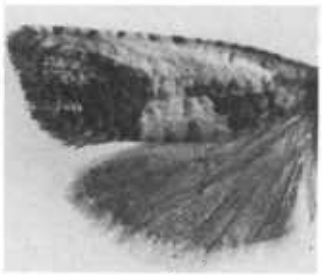
Forewing 5.0 to 8.0 mm long, dark areas and markings brownish black or grayish brown. Adults captured June 21–August 30. MI, WI, MN. Syst: Miller (1985c).
(33 N, 5 Gm, 5 Gf, T)

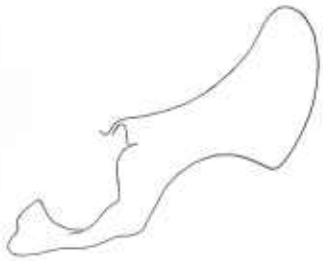


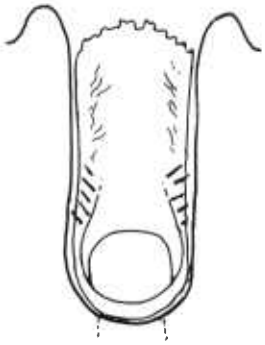
Female unknown

Eucosma palabundana Heinrich

Forewing 7.0 to 8.5 mm long, dark areas and markings grayish brown or grayish yellowish brown. Adults captured July 17–August 11. MI. Syst: Heinrich (1923b).
(11 N, 5 Gm, T)

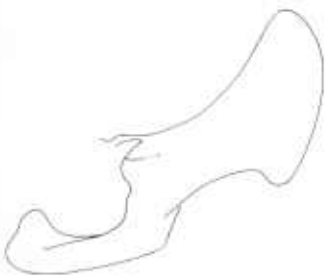


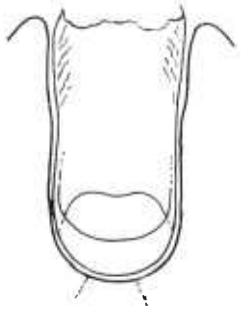




Eucosma giganteana (Riley)

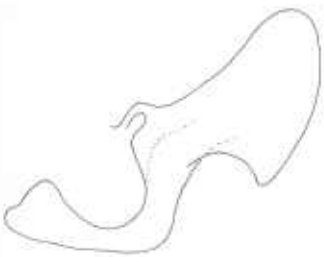
Forewing 12.0 to 17.0 mm long, dark areas and markings yellowish brown or brownish black. Adults captured July 9–August 10. MI, WI, MN. Larva feeds in *Silphium* roots. Syst: Heinrich (1923b). Biol: Godfrey *et al.* (1987).
(5 N, 1 Gm, 3 Gf, T)

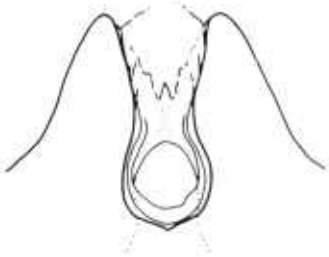




Eucosma bipunctella (Walker)

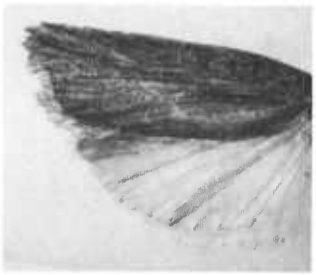
Forewing 16.5 to 18.0 mm long, pale areas yellow. Adults captured June 6–22. MI, WI. Larva feeds in *Silphium* roots. Syst: Heinrich (1923b). Biol: MacKay (1959).
(4 N, 2 Gm, 1 Gf, T)

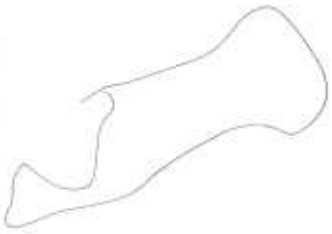


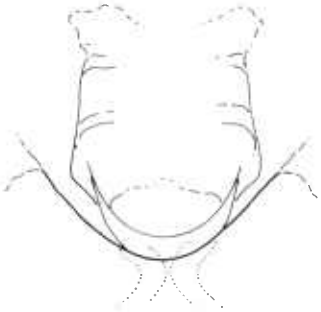


Eucosma bilineana Kearfott

Forewing 12.5 mm long, variable pattern; dark areas and markings yellowish brown or brownish black. Limits of variation shown. Ovipositor with ventral extensions of papillae anales. Adult captured June 24. MI. Larva feeds on *Helianthus*. Syst: Heinrich (1923b). Biol: Brown *et al.* (1983).
(1 N, 1 Gm, T, top photo specimen Kossuth Co., IA, bottom, Winnipeg, MB)

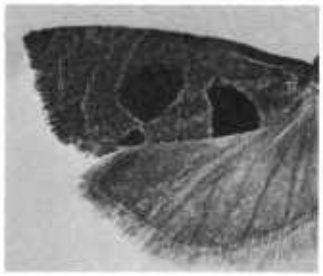


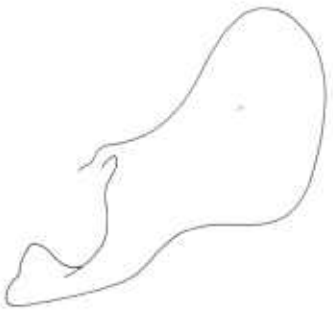


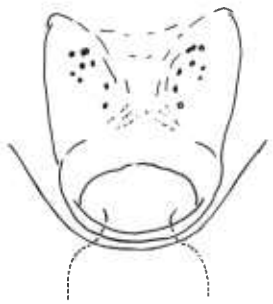


Eucosma nandana Kearfott

Forewing 12.0 mm long, dark areas yellowish brown. Sides of female corpus bursae sclerotized near ductus bursae. Adult captured Aug 19. MN. Syst: Heinrich (1923b).
(1 N, 1 Gm, T)

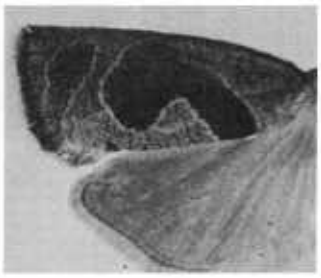


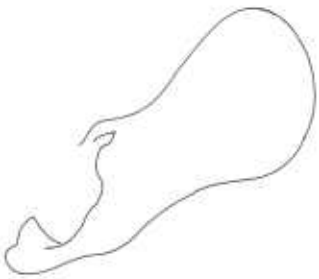


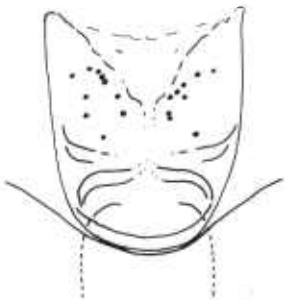


Eucosma dorsisignatana (Clemens)

Forewing 8.5 to 11.0 mm long, dorsal markings brown. Adults captured July 30–October 12. MI, MN. Larva feeds in *Solidago* roots. Syst and Biol: Miller (1985c).
(63 N, 10 Gm, 9 Gf, T)

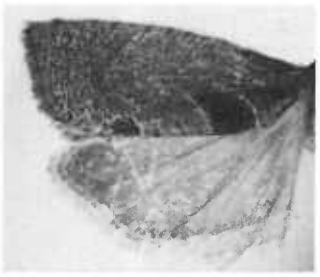


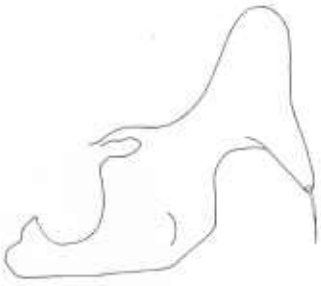


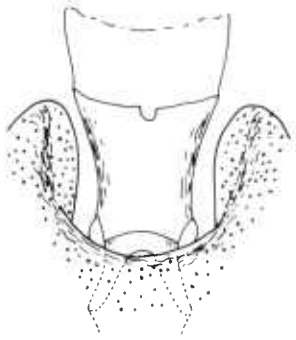


Eucosma similiana (Clemens)

Forewing 6.5 to 10.0 mm long, variable pattern; dorsal markings brown. Adults captured July 28–September 14. Limits of variation shown. MI, WI, MN. Univoltine. Larva feeds in *Solidago* rootstalks. Syst: Miller (1985c). Biol: Čapek (1971).
(45 N, 11 Gm, 9 Gf, T)

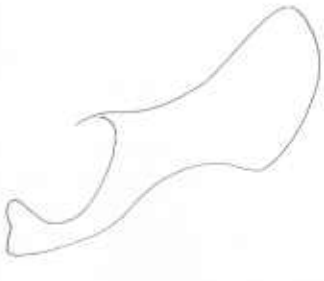


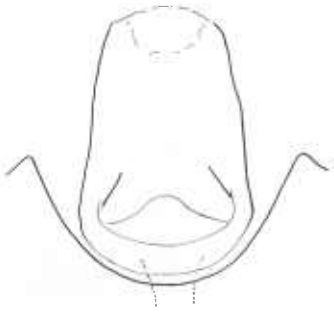




Eucosma derelicta Heinrich

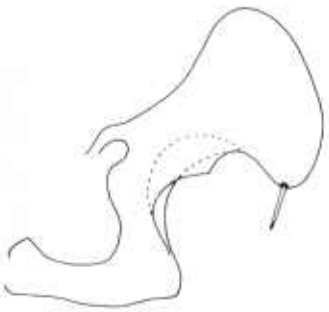
Forewing 5.5 to 8.5 mm long, dark areas yellowish brown. Adults captured July 6–August 26. MI, WI, MN. Larva feeds in *Solidago* rootstalks. Syst: Heinrich (1929). Biol: Čapek (1971).
(82 N, 10 Gm, 5 Gf, T)

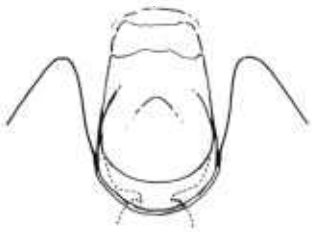




Eucosma fulminana (Walsingham)

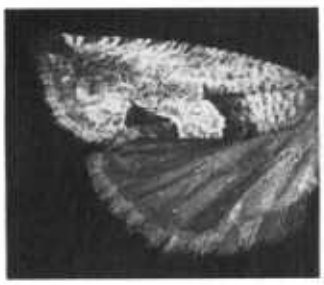
Forewing 11.0 mm long, brown with silver specks. No capture date. MI. Syst: Heinrich (1923b).
(1 N, 1 Gm, T)

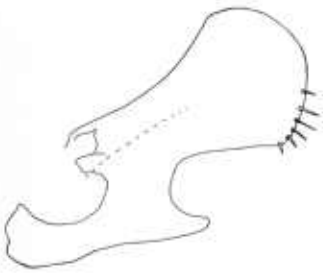


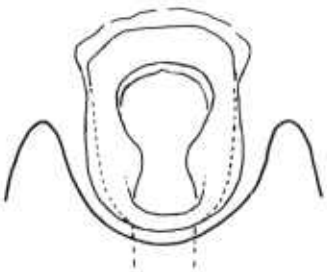


Eucosma sombreana Kearfott

Forewing 7.0 to 12.5 mm long, grayish brown or yellowish brown. Adults captured June 26–August 27. MI, WI, MN. Univoltine. Larva feeds in *Helianthus* rootstalks. Syst and Biol: Heinrich (1923b).
(43 N, 10 Gm, 3 Gf, T)

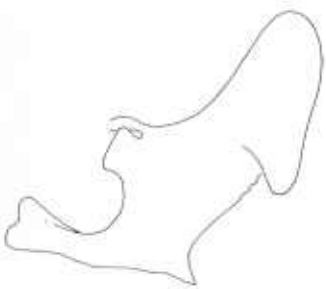


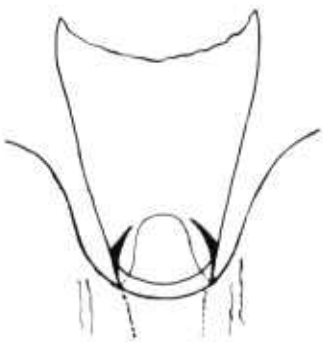




Eucosma consobrinana Heinrich

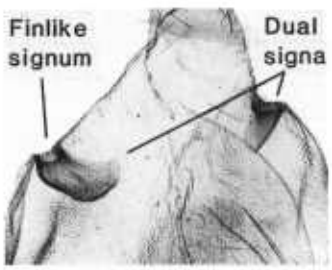
Forewing 6.0 to 9.0 mm long, dark markings brownish black. Adults captured June 7–September 1. MI, WI, MN. Syst: Heinrich (1923b).
(85 N, 9 Gm, 10 Gf, T)





Eucosma cataclystiana (Walker)

Forewing 6.0 to 8.5 mm long, dark areas orange yellow or yellowish brown. Adults captured June 22–September 7. MI, WI, MN. Larva feeds in *Solidago* rootstalks. Syst: Heinrich (1923b). Biol: Putman (1942).
(36 N, 8 Gm, 3 Gf, T)



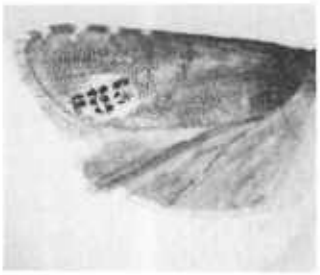
Genus *Pelochrista*

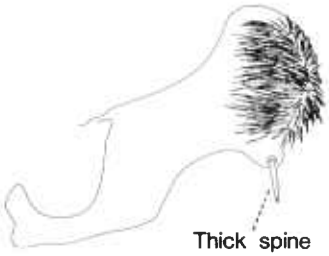
Both sexes. Forewing without raised scale tufts, apex not falcate, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate, M_2 and M_3 separate, Cu_2 not originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

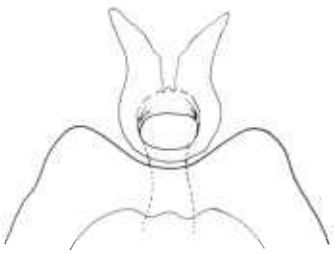
Male. Antenna not notched near base. Forewing with costal fold. Hindwing without upper-surface melanic sex scaling. Socius finger- or ribbonlike, not heavily sclerotized; valva not divided, sacculus not densely clothed with spinelike setae, without rudimentary clasper, outer surface lacking spinelike setae, with thick spinelike seta on cucullus at lower margin.

Female. Sternum 7 emarginate posteriorly or inflected and overlapping ostium bursae. Lamella antevaginalis not conical. Ductus bursae sclerotized less than two-thirds its length from genital opening; corpus bursae with two thorn- or finlike signa.

Comments. More than 20 Nearctic species of *Pelochrista* are known.

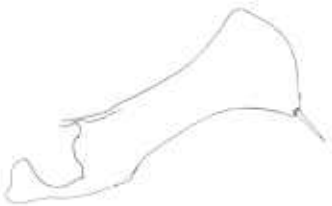


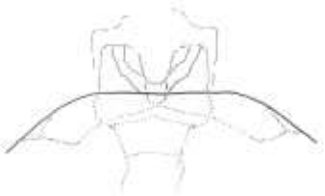




Pelochrista scintillana (Clemens)

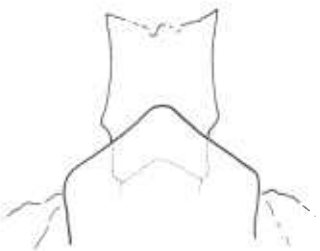
Forewing 7.5 to 11.5 mm long, medium pale areas orange yellow. Ovipositor with ventral extensions of papillae anales. Adults captured May 29–August 4. MI, WI, MN. Larva feeds on *Helianthus*. Syst: Heinrich (1923b). Biol: Walker (1936).
(23 N, 8 Gm, 3 Gf, T)





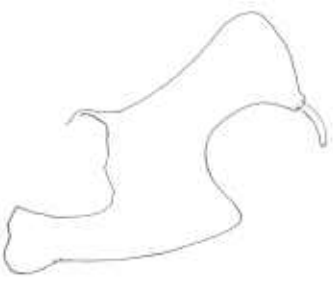
Pelochrista corosana (Walsingham)

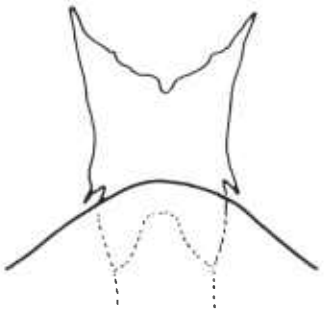
Forewing 6.5 mm long, dark areas and markings grayish brown or brownish black. Adult captured July 23. MN. Syst: Heinrich (1923b).
(1 N, 1 Gm, T, photo specimen Fillmore Co., NE)



Pelochrista zomonana (Kearfott)

Forewing 5.0 to 6.5 mm long, dark areas and markings grayish brown or brownish black. Sides of female corpus bursae sclerotized near ductus bursae. Adults captured June 10–September 8. MI. Larva feeds in *Chrysanthemum* roots and stems. Syst: Heinrich (1923b). Biol: MacKay (1959).
(20 N, 11 Gm, 2 Gf, T)





Pelochrista womonana (Kearfott)

Forewing 6.5 to 9.0 mm long, dark areas and markings grayish yellowish brown or brownish black. Sides of female corpus bursae sclerotized near ductus bursae. Adults captured June 10–August 11. MI, MN. Larva feeds in *Helianthus* roots. Syst: Heinrich (1923b). Biol: Rogers *et al.* (1979).
(11 N, 9 Gm, 1 Gf, T)

Genus *Epiblema*

Both sexes. Forewing without raised scale tufts, termen straight or slightly concave, apex not falcate, R_1 originating well before middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate, M_2 and M_3 separate. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

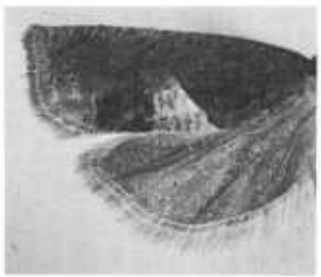
Male. Antenna not notched near base. Forewing with costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; socius finger- or ribbonlike, not heavily sclerotized; valva not divided, sacculus not densely clothed with spinelike setae, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin; vesica with all cornuti deciduous.

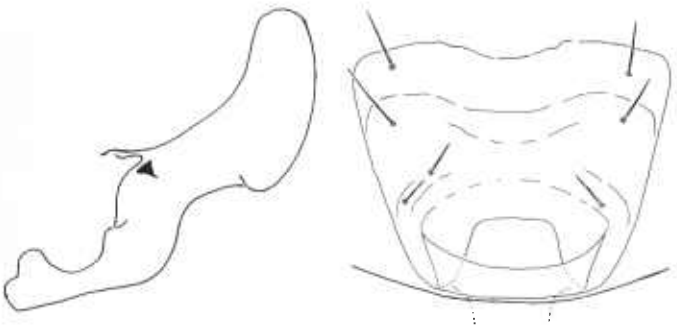
Female. Sternum 7 neither inflected nor overlapping ostium bursae. Lamella antevaginalis not developed. Ductus bursae sclerotized less than two-thirds its length from genital opening; corpus bursae without sclerotized sides, with two thorn- or finlike signa.

Comments. Among the species treated here, males of all except *Epiblema tandana* have a rudimentary valval clasper.

Nearly 40 Nearctic species of *Epiblema* are known. Brown (1973) gives a generic treatment.

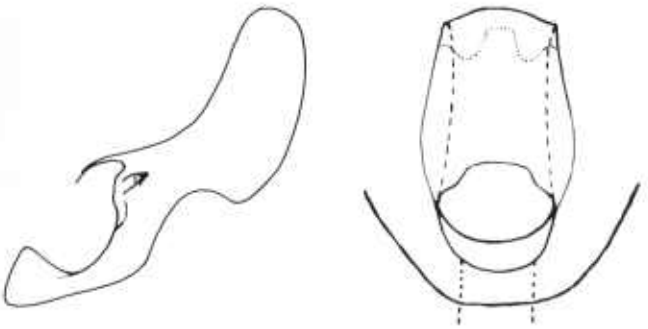
Because specific distinctness between *E. strenuana* and *E. minutana* (Kearfott) is doubtful (Miller and Pogue 1984), these two are considered the *E. strenuana* complex here.





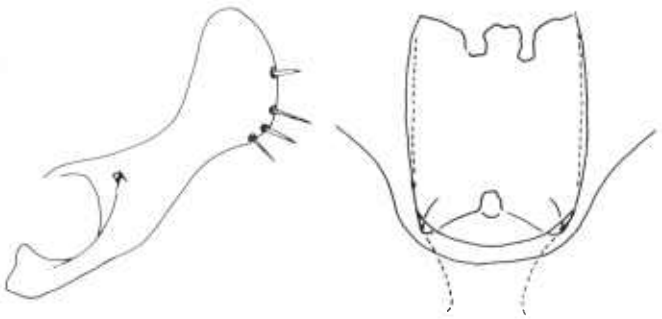
Epiblema boxcana (Kearfott)

Forewing 5.5 to 7.5 mm long, dark areas yellowish brown. Female ductus bursae sclerotized near middle. Adults captured May 28–July 19. MI, MN. Syst: Heinrich (1923b). (34 N, 6 Gm, 5 Gf, T)



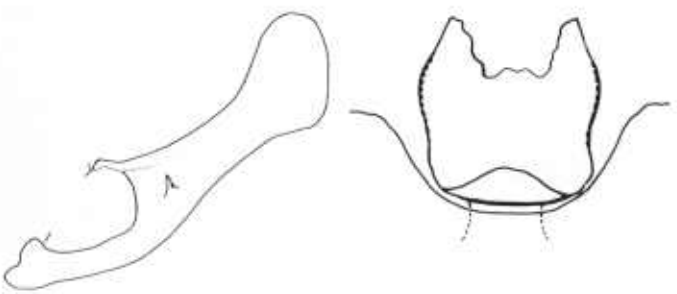
Epiblema strenuana (Walker) complex. Ragweed borer

Forewing 4.5 to 9.0 mm long, dark areas grayish brown. Female ductus bursae sclerotized near middle. Adults captured May 28–September 23. MI, WI, MN. Bivoltine. Larva bores in stems and branches of *Ambrosia, Xanthium, Chenopodium.* Syst and Biol: Miller and Pogue (1984). (93 N, 36 Gm, 27 Gf, T)



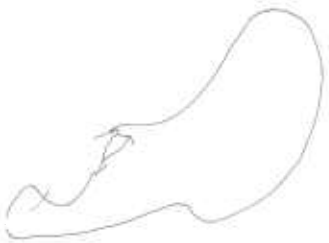
Epiblema abruptana (Walsingham)

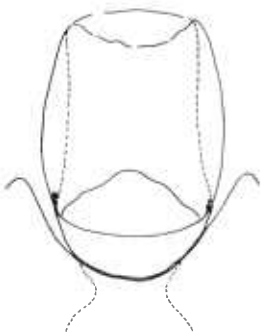
Forewing 6.0 to 6.5 mm long, dark areas yellowish brown. Female ductus bursae not sclerotized near middle. Adults captured June 21–July 10. MI. Syst: Heinrich (1923b). (2 N, 2 Gm, T, photo specimen Clay Co., MO)



Epiblema numerosana (Zeller)

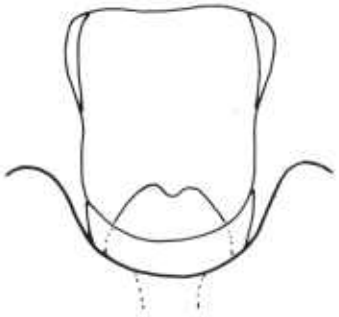
Forewing 6.0 to 8.5 mm long, dark areas grayish yellowish brown. Female ductus bursae not sclerotized near middle. Adults captured June 24–August 6. MN. Syst: Miller (1985a). (25 N, 4 Gm, 6 Gf, T)





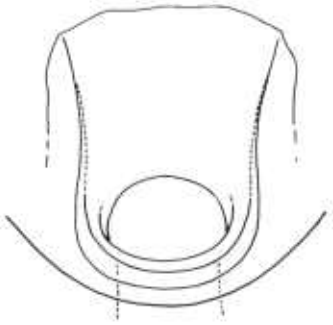
Epiblema luctuosissima
Blanchard

Forewing 5.0 to 6.0 mm long, dark areas grayish brown. Female ductus bursae not sclerotized near middle. Adults captured June 17–August 16. MI, MN. Syst: Blanchard (1984). (10 N, 7 Gm, 3 Gf)



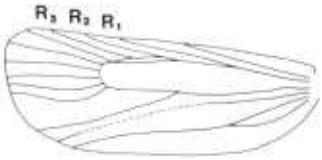
Epiblema tripartitana (Zeller)

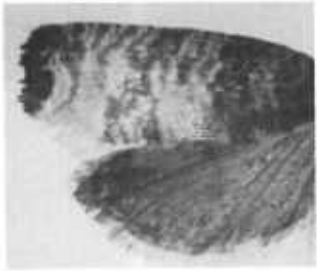
Forewing 5.5 to 6.5 mm long, basal patch brownish black. Adults captured June 30–July 2. MI, WI. Larva feeds in flower heads and stems of *Rudbeckia*. Syst: Heinrich (1923b). Biol: Bottimer (1926). (6 N, 2 Gm, 1 Gf, T)

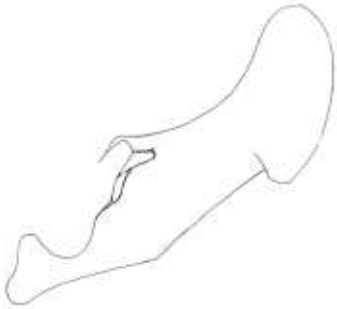


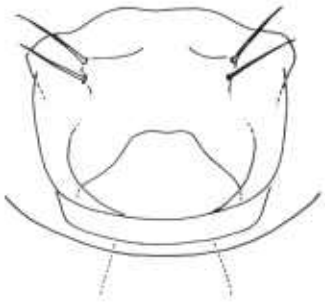
Epiblema scudderiana
(Clemens)

Forewing 7.0 to 10.5 mm long, dark areas and markings grayish brown or brownish black. Adults captured May 9–July 27. MI, WI, MN. Univoltine. Larva feeds on *Solidago*, mainly in stems. Syst and Biol: Miller (1976a). (145 N, 12 Gm, 5 Gf, T)



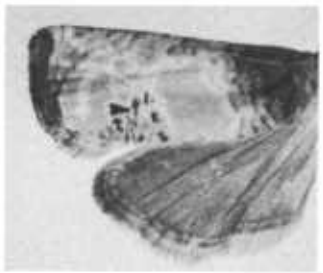


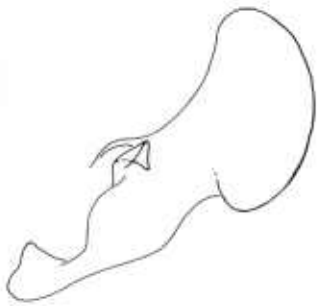


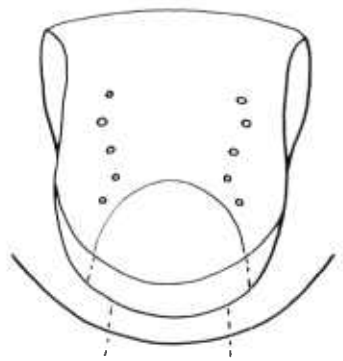


Epiblema obfuscana (Dyar)

Forewing 5.5 to 9.5 mm long, dark areas and markings grayish brown or brownish black. Adults captured May 18–June 14. MI, WI. Larva feeds in *Solidago* stems. Syst: Heinrich (1923b). Biol: Putman (1942). (13 N, 5 Gm, 3 Gf, T)

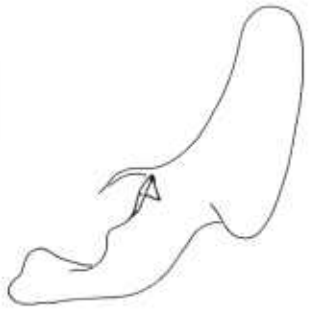


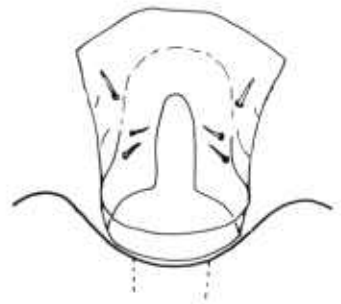




Epiblema desertana (Zeller)

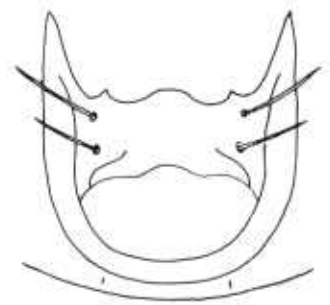
Forewing 7.0 to 8.5 mm long, dark areas and markings grayish brown or brownish black. Adults captured May 24–June 25. MI. Univoltine. Larva feeds on *Solidago*, mainly in stems. Syst and Biol: Miller (1976a).
(28 N, 6 Gm, 4 Gf, T)





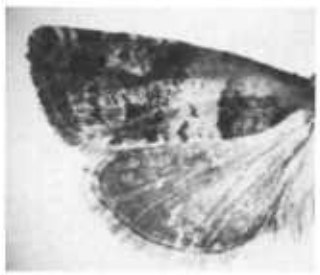
Epiblema carolinana (Walsingham)

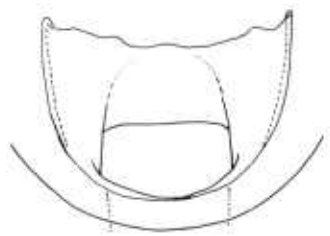
Forewing 8.5 to 11.0 mm long, dark areas and markings grayish brown or brownish black. Adults captured July 4–August 6. MI, WI, MN. Univoltine. Larva feeds on *Rudbeckia*, mainly in roots. Syst: Heinrich (1923b). Biol: Thompson (1928).
(11 N, 2 Gm, 2 Gf, T)



Epiblema walsinghami (Kearfott)

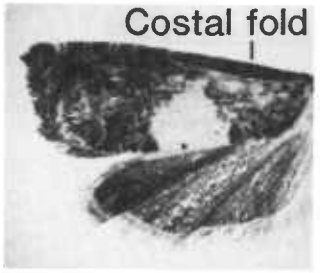
Forewing 8.0 to 9.0 mm long, dark areas and markings yellowish brown or brownish black. Adults captured June 30–July 18. MI. Syst: Heinrich (1923b).
(10 N, 7 Gm, 1 Gf, T)

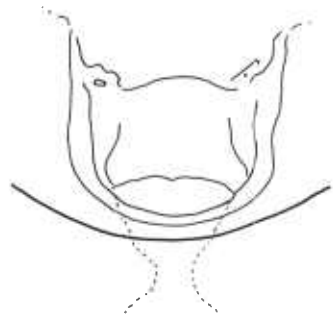




Epiblema iowana McDunnough

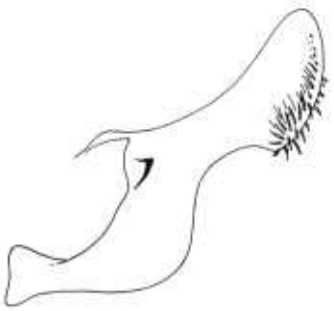
Forewing 6.5 mm long, dark markings brownish black. No capture date. MN. Larva feeds in *Ratibida* roots. Syst: Miller (1985a). Biol: Godfrey *et al.* (1987).
(1 N, 1 Gm, photo specimen Boone Co., MO)

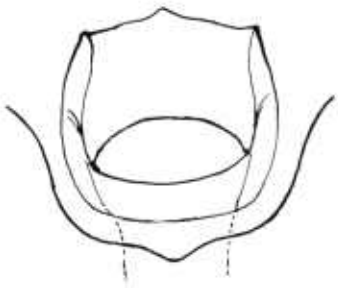




Epiblema infelix Heinrich

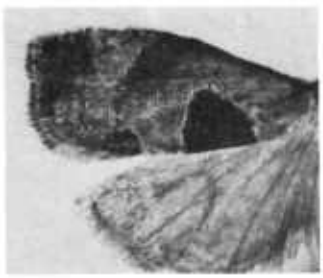
Forewing 5.5 to 7.5 mm long, dark areas and markings grayish brown or brownish black. Adults captured June 25–30. MI. Syst: Heinrich (1923b).
(10 N, 9 Gm, T)

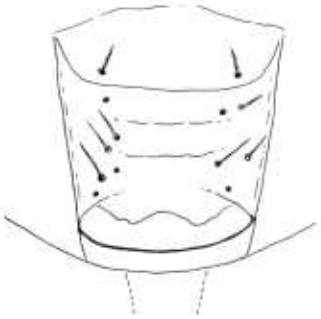




Epiblema otiosana
(Clemens). Bidens borer

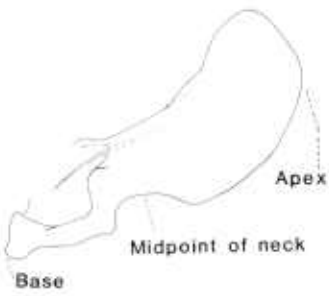
Forewing 6.0 to 9.0 mm long, dark areas grayish brown or brownish black. Variants shown are common (top) and rare (bottom). Adults captured May 30-August 30. MI, WI, MN. Larva feeds on *Bidens*, mainly in stems. Syst: Heinrich (1923b). Biol: Decker (1932).
(80 N, 5 Gm, 7 Gf, T)

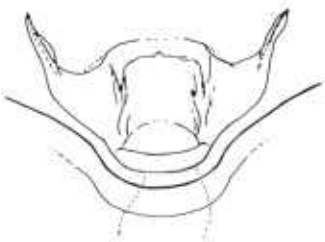




Epiblema brightonana (Kearfott)

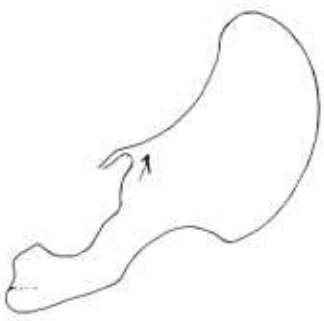
Forewing 5.5 to 7.0 mm long, dark markings brownish black. Adults captured June 21–August 2. MI. Syst: Heinrich (1923b).
(12 N, 4 Gm, 1 Gf, T)

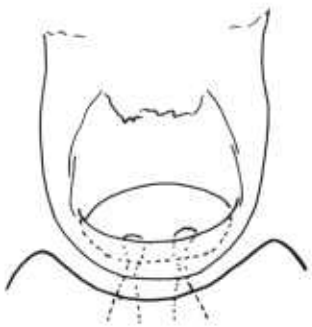




Epiblema tandana (Kearfott)

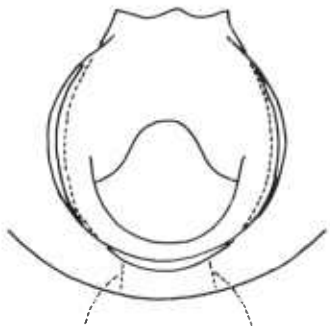
Forewing 8.0 to 10.0 mm long, dark markings brownish black. Adults captured June 5—July 21. MI, MN. Larva feeds in roots of *Rudbeckia*. Syst: Heinrich (1923b). Biol: Godfrey *et al.* (1987).
(9 N, 5 Gm, T, photo specimen Bergen Co., NJ)





Epiblema resumptana (Walker)

Forewing 5.5 to 6.0 mm long, dark areas grayish brown or brownish black. Adults captured May 27–June 2. MI. Larva probably feeds on *Anaphalis margaritacea*. Syst and Biol: McDunnough (1959).
(2 N, 2 Gm, T)



Epiblema dorsisuffusana (Kearfott)

Forewing 8.0 to 9.0 mm long, dark areas brownish black. Adults captured June 20–July 25. MI. Syst: Heinrich (1923b).
(3 N, 2 Gm, 1 Gf, T)

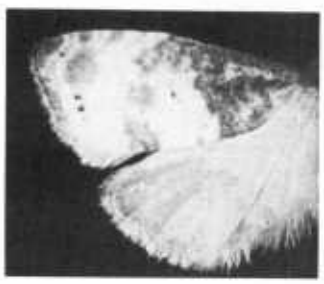
Genus *Notocelia*

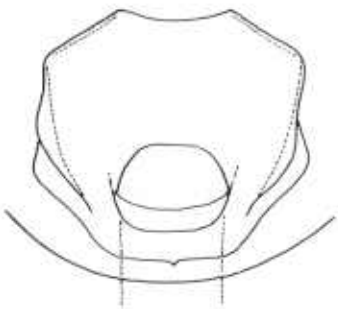
Both sexes. Forewing without raised scale tufts, termen straight, apex not falcate, R_1 originating well before middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate, M_2 and M_3 separate. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

Male. Antenna not notched near base. Forewing with costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; socius finger- or ribbonlike, not heavily sclerotized; valva not divided, sacculus not densely clothed with spinelike setae, with rudimentary clasper, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin; vesica with deciduous and nondeciduous cornuti.

Female. Sternum 7 not deeply emarginate around ostium bursae, neither inflected nor overlapping ostium bursae. Lamella antevaginalis not conical, not wider than lamella postvaginalis in anteroposterior orientation. Ductus bursae sclerotized less than two-thirds its length from genital opening; corpus bursae without sclerotized sides, with two thorn- or finlike signa.

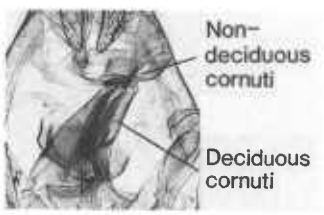
Comments. Four Nearctic species of *Notocelia* are known.

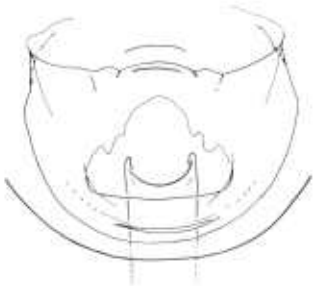




Notocelia illotana (Walsingham)

Forewing 6.5 to 8.5 mm long, dark areas and markings grayish brown or brownish black. Adults captured May 25–June 22. MI. Syst: Brown (1979a).
(12 N, 3 Gm, 3 Gf, T)





Notocelia culminana
(Walsingham)

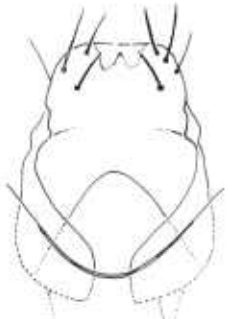
Forewing 7.0 to 8.5 mm long, dark areas and markings grayish brown or brownish black. Adults captured July 27–August 26. MI. Larva feeds in tied *Rosa* leaves. Syst: Brown (1979a). Biol: MacKay (1959).
(5 N, 2 Gm, 2 Gf, T)

Both sexes. Forewing without raised scale tufts, termen concave, apex not falcate, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 united, M_2 and M_3 separate at base, M_2, M_3, and Cu_1 approximate at termen, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 united.

Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; socius present; valva not divided, without rudimentary clasper, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin.

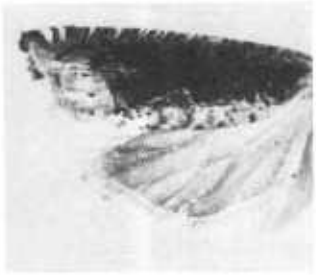
Female. Sternum 7 not deeply emarginate around ostium bursae, neither inflected nor overlapping ostium bursae. Ductus bursae sclerotized near middle; corpus bursae without sclerotized sides, with two finlike signa.

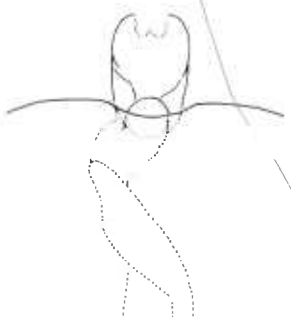
Comments. Six Nearctic species of *Suleima* are known.



Suleima helianthana
(Riley). Sunflower bud moth

Forewing 6.5 to 7.0 mm long, dark areas and markings grayish yellowish brown or brownish black. Adults captured July 18–30. MI. Bivoltine. Larva feeds in buds, stems, and receptacles of *Helianthus*, *Coreopsis* Syst: Heinrich (1923b). Biol: Satterthwait (1948).
(2 N, 2 Gm, T)





Suleima cinerodorsana Heinrich

Forewing 6.5 mm long, dark areas brownish black. Adult captured July 24. MI. Larva feeds in *Helianthus* stems. Syst: Heinrich (1923b). Biol: Putman (1942).
(1 N, 1 Gm, T, photo specimen Allegheny Co., PA)

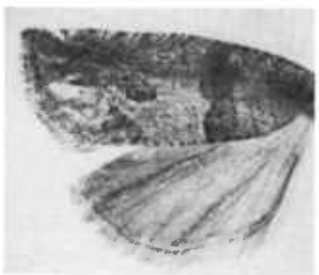
Genus *Sonia*

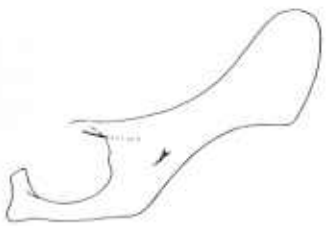
Both sexes. Forewing without raised scale tufts, termen concave, apex not falcate, R_1 originating well before middle of discal cell, upper internal vein of discal cell, originating between R_1 and R_2, R_4 and R_5 united, M_2 and M_3 separate at base, M_2, M_3, and Cu_1 approximate at termen, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

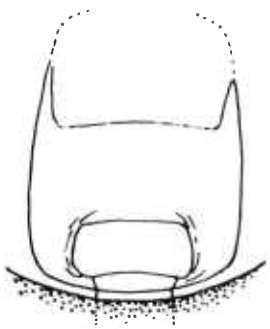
Male. Antenna not notched near base. Forewing with costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; socius present; valva not divided, with rudimentary clasper, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin.

Female. Sternum 7 not deeply emarginate around ostium bursae, neither inflected nor overlapping ostium bursae. Ductus bursae with a sclerotized patch near middle; corpus bursae without sclerotized sides, with two finlike signa.

Comments. Six Nearctic species of *Sonia* are known.

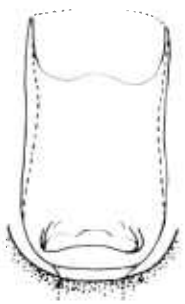






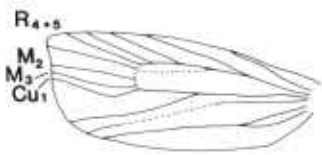
Sonia paraplesiana Blanchard

Forewing 6.0 to 7.0 mm long, dark areas and markings brown. Adults captured July 7–August 10. MI, MN. Syst: Blanchard (1979).
(6 N, 5 Gm, 1 Gf)



Sonia canadana McDunnough

Forewing 6.0 to 8.5 mm long, dark areas brown. Adults captured July 8–August 23. MI. Larva feeds in rootstalks of *Aster, Solidago*. Syst: McDunnough (1925b). Biol: Čapek (1971).
(20 N, 10 Gm, 4 Gf, T)



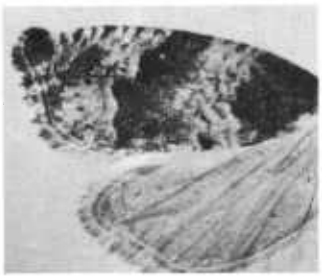
Genus *Gypsonoma*

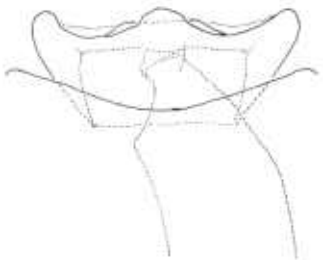
Both sexes. Forewing without raised scale tufts, termen slightly concave, apex not falcate, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originiating between R_2 and R_3, R_4 and R_5 separate or approximate, M_2 and M_3 not connate, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 stalked, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; socius present; valva not divided, with rudimentary clasper, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin.

Female. Sternum 7 neither inflected nor overlapping ostium bursae. Lamella antevaginalis wider than lamella postvaginalis in anteroposterior orientation. Ductus bursae sclerotized less than three-quarters its length from genital opening; corpus bursae without sclerotized sides, with two thornlike signa.

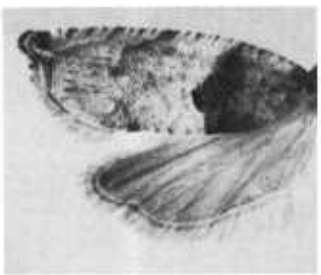
Comments. Seven Nearctic species of *Gypsonoma* are known.

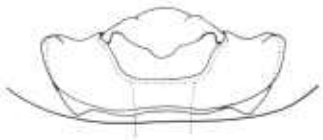




Gypsonoma fasciolana (Clemens)

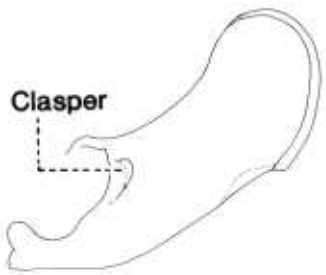
Forewing 6.0 to 8.0 mm long, dark areas and markings grayish brown or brownish black. Adults captured May 29–July 23. MI, WI, MN. Larva feeds in rolled leaves of *Salix, Populus*. Syst: Heinrich (1923b). Biol: Prentice (1966).
(107 N, 19 Gm, 5 Gf, T)

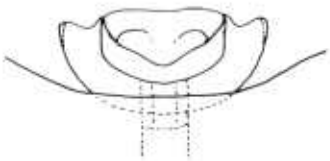




Gypsonoma haimbachiana (Kearfott). Cottonwood twig borer

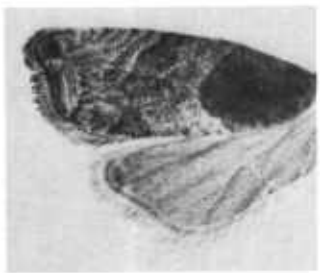
Forewing 5.5 to 7.5 mm long, dark areas and markings grayish brown or brownish black. Female ductus bursae not sclerotized. Adults captured June 26–August 12. MI, WI, MN. Larva feeds on *Populus deltoides*, primarily in shoots. Syst: Heinrich (1923b). Biol: Morris (1967).
(16 N, 3 Gm, 3 Gf, T)

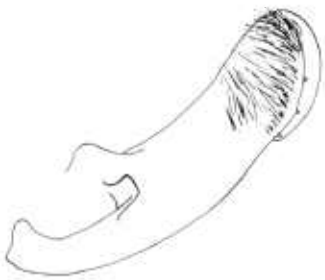


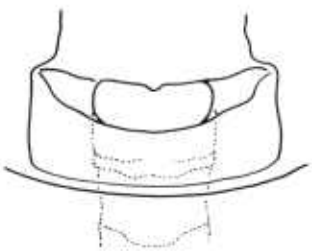


Gypsonoma substitutionis Heinrich

Forewing 4.5 to 6.0 mm long, dark areas and markings grayish yellowish brown or brownish black. Adults captured June 7–August 12. MI, WI. Larva feeds in rolled leaves of *Populus, Quercus, Acer*. Syst: Heinrich (1923b). Biol: Prentice (1966).
(17 N, 9 Gm, 1 Gf, T)

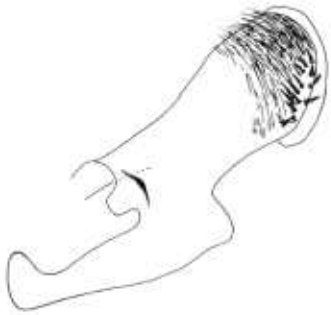


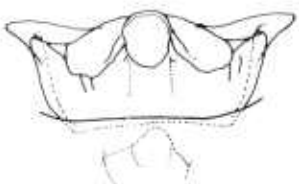




Gypsonoma salicicolana (Clemens)

Forewing 5.5 mm long, dark areas and markings grayish brown. Adult captured June 20. MI. Larva feeds in rolled *Salix* leaves. Syst: Heinrich (1923b). Biol: Prentice (1966).
(1 N, 1 Gm, T)





Gypsonoma adjuncta Heinrich

Forewing 5.5 to 7.0 mm long, dark areas and markings black. Adults captured June 24–July 17. MI, WI, MN. Larva feeds in rolled *Populus* leaves. Syst: Heinrich (1924). Biol: Prentice (1966).
(9 N, 5 Gm, 3 Gf, T)

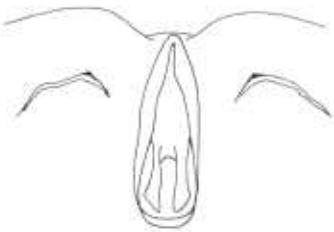
Genus *Proteoteras*

Both sexes. Forewing with raised scale tufts near lower margin of discal cell, termen concave or straight, forewing not falcate, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate, M_2 and M_3 separate at base, M_2, M_3, and Cu_1 approximate at termen, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

Male. Antenna not notched near base. Forewing without costal fold. Hindwing with upper-surface melanic sex scaling or hair pencil near costa. Socius present; valva not divided, without rudimentary clasper, outer surface with long, flat spinelike setae, without thick spinelike seta on cucullus at lower margin.

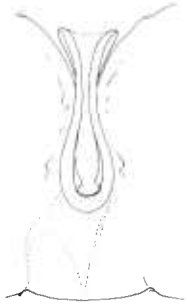
Female. Sternum 7 deeply emarginate around ostium bursae, neither inflected nor overlapping ostium bursae, with narrow, recessed lamella postvaginalis, ostium bursae elongate. Ductus bursae sclerotized near middle; corpus bursae without sclerotized sides, with two finlike signa.

Comments. Eight Nearctic species of *Proteoteras* are known.



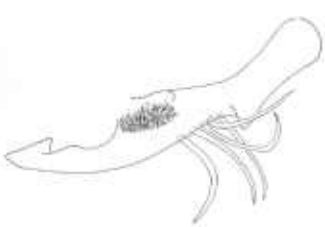
Proteoteras aesculana Riley

Forewing 6.0 to 9.0 mm long, dark areas and markings grayish olive green or olive black. Adults captured April 12–October 2. MI, WI, MN. Larva feeds in leafstalks, seeds, and shoots of *Acer negundo, Aesculus*. Syst: Wong *et al.* (1983). Biol: Powell (1962). (63 N, 13 Gm, 6 Gf, T)



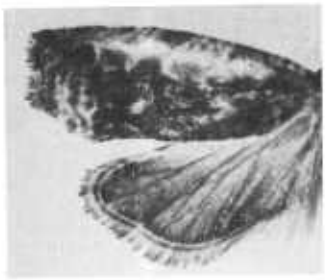
Proteoteras willingana (Kearfott). Boxelder twig borer

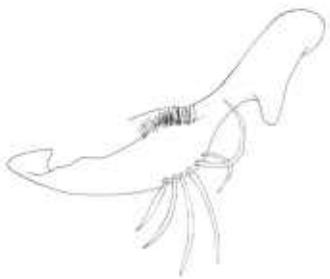
Forewing 7.0 to 8.5 mm long, dark areas and markings grayish yellowish brown or brownish black. Adults captured June 19–July 23. MI, MN. Univoltine. Larva feeds on leaves, and in buds and shoots of *Acer negundo*. Syst: Wong *et al.* (1983). Biol: Peterson (1958). (27 N, 6 Gm, 7 Gf, T)



Proteoteras crescentana Kearfott

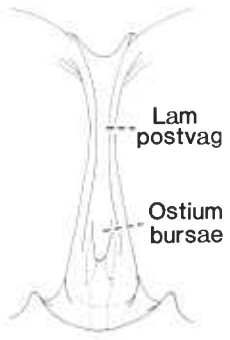
Forewing 7.0 to 9.0 mm long, pale area within dark crescent yellowish brown or grayish yellowish brown. Adults captured June 8–July 15. MI, WI, MN. Larva feeds in *Acer negundo* shoots. Syst: Wong *et al.* (1983). Biol: Prentice (1966). (10 N, 4 Gm, 2 Gf, T)





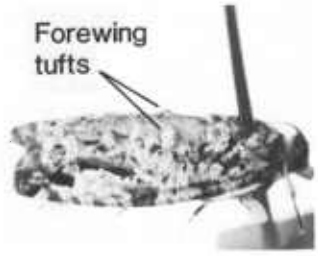
Proteoteras naracana Kearfott

Forewing 7.0 to 8.0 mm long, dark areas and markings brown or brownish black. Adults captured June 6–26. MI. Larva feeds on *Acer*. Syst: Heinrich (1923b). Biol: Godfrey *et al.* (1987).
(8 N, 3 Gm, 2 Gf, T)



Proteoteras moffatiana Fernald

Forewing 7.0 to 9.5 mm long, pale areas green. Adults captured July 5–August 30. MI, WI, MN. Univoltine. Larva feeds in buds and shoots of *Acer saccharum, A. rubrum, A. saccharinum*. Syst: Heinrich (1923b). Biol: Prentice (1966).
(58 N, 18 Gm, 12 Gf, T)



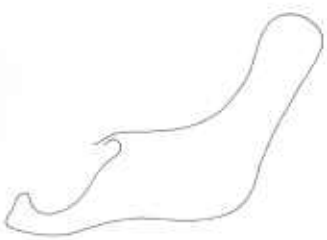
Genus *Zeiraphera*

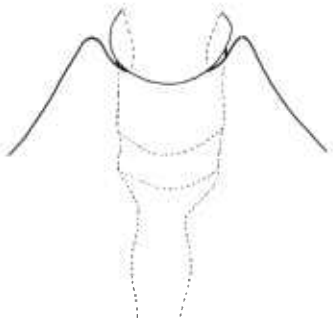
Both sexes. Forewing without raised scale tufts, termen straight or slightly concave, apex not falcate, R_1 originating well before middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 not united, M_2 and M_3 separate. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Socius not finger- or ribbonlike; valva not divided, sacculus not densely clothed with spinelike setae, without rudimentary clasper, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at anal angle.

Female. Sternum 7 neither inflected nor overlapping ostium bursae. Ductus bursae with a sclerotized patch near middle; corpus bursae without sclerotized sides, with two thorn- or finlike signa.

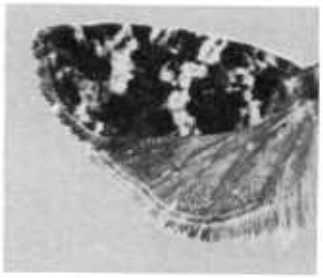
Comments. Eight Nearctic species of *Zeiraphera* are known. Mutuura and Freeman (1966) reviewed the species of *Zeiraphera*.

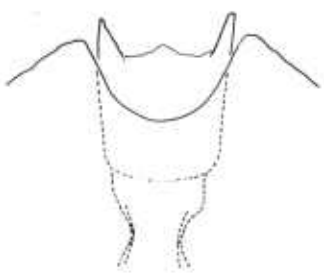




Zeiraphera canadensis Mutuura and Freeman. Spruce bud moth

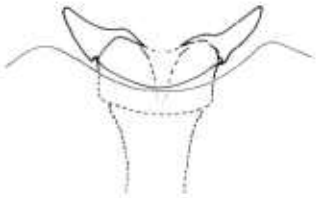
Forewing 6.0 to 6.5 mm long, pale areas orange yellow. Adults captured July 18–24. MI, WI. Univoltine. Larva feeds on buds and foliage of *Picea glauca, P. mariana, Abies balsamea*. Syst: Mutuura and Freeman (1966). Biol: Pilon (1965).
(7 N, 2 Gm, 3 Gf, T)





Zeiraphera fortunana (Kearfott)

Forewing 5.5 mm long, dark markings grayish brown or brownish black. Adult captured July 6. WI. Univoltine. Larva feeds progressively on buds and needles of *Picea, Abies*. Syst: Mutuura and Freeman (1966). Biol: Prentice (1966).
(1 N, 1 Gm, T, photo specimen Carleton Co., ON)



Zeiraphera unfortunana Powell

Forewing 7.0 mm long, dark markings black or grayish yellowish brown. Adults captured July 22–August 8. MI, MN. Larva feeds on *Picea, Abies*. Syst: Powell (1983). Biol: Mutuura and Freeman (1966).
(2 N, 2 Gm, photo specimen Thunder Bay Co., ON)

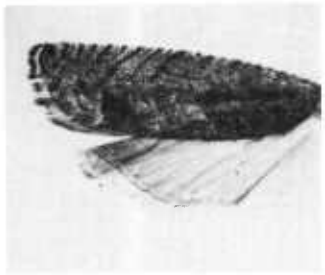
Genus *Pseudexentera*

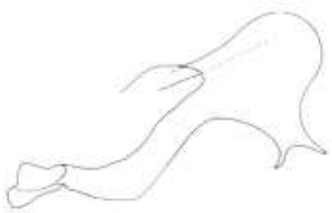
Both sexes. Forewing without raised scale tufts, termen concave, apex not falcate, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 not united, M_2 and M_3 not connate, M_2, M_3, and Cu_1 approximate at termen, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

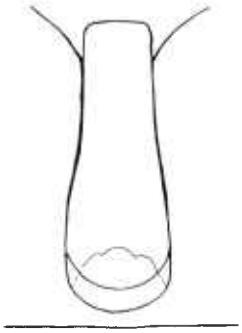
Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; socius not finger- or ribbonlike; valva not divided, sacculus densely clothed with spinelike setae, without rudimentary clasper, outer service lacking spinelike setae, without thick spinelike seta on cucullus at lower margin.

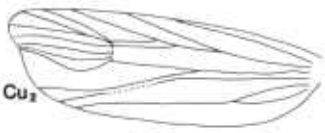
Female. Sternum 7 deeply emarginate around ostium bursae, neither inflected nor overlapping ostium bursae. Lamella antevaginalis not conical, lamella postvaginalis not recessed, ostium bursae not elongate. Ductus bursae sclerotized near middle; corpus bursae without sclerotized sides, with two finlike signa.

Comments. Nearly 20 Nearctic species of *Pseudexentera* are known. Miller (1986b) reviewed the species of *Pseudexentera*.



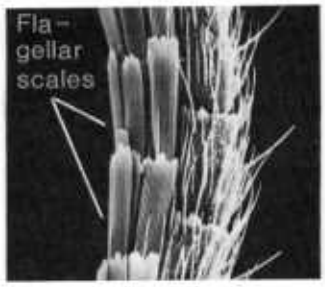


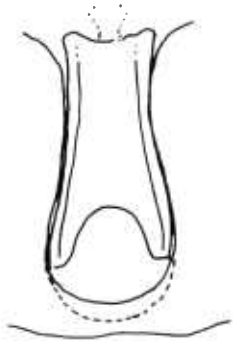




Pseudexentera cressoniana (Clemens)

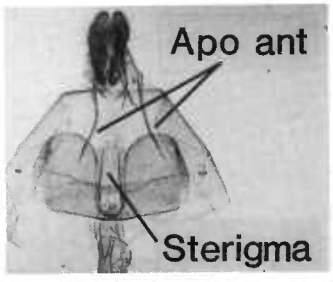
Forewing 8.0 to 10.5 mm long, pale areas brownish gray. Adults captured March 31–May 31. MI, WI. Larva feeds on *Carya*. Syst and Biol: Miller (1986b).
(55 N, 13 Gm, 13 Gf, T)

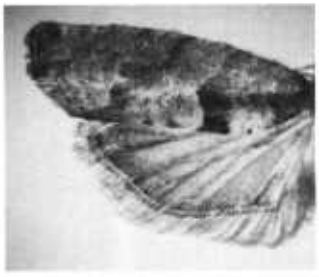


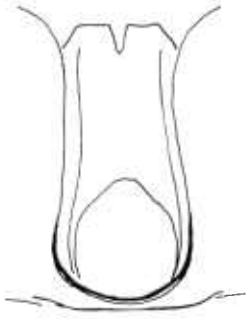


Pseudexentera faracana (Kearfott)

Forewing 7.0 to 9.5 mm long, variable pattern; dark markings medium brown or dark brown. Most divergent variants shown. Adults captured April 6–May 7. MI, WI. Univoltine. Larva feeds in rolled *Castanea* leaves. Syst and Biol: Miller (1986b).
(4 N, 1 Gm, 3 Gf, T, top photo specimen Putnam Co., IL, bottom, Allegheny Co., PA)

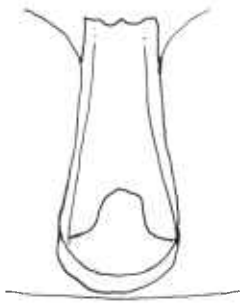






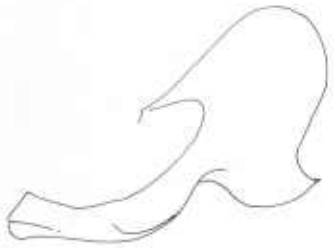
Pseudexentera sepia Miller

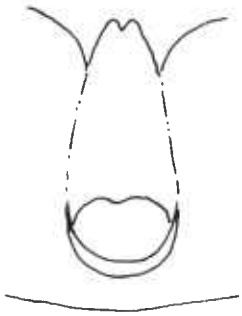
Forewing 7.0 mm long, dark markings dark brown. Adults captured April 25–May 20. WI. Syst: Miller (1986b).
(2 N, 1 Gm, 1 Gf, T)



Pseudexentera haracana (Kearfott)

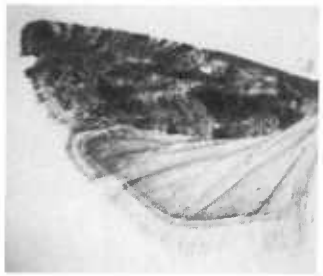
Forewing 8.0 mm long, dark markings brownish black. Adults captured May 2–30. MI, WI, MN. Syst: Miller (1986b).
(3 N, 3 Gm, T, photo specimen Boone Co., MO)

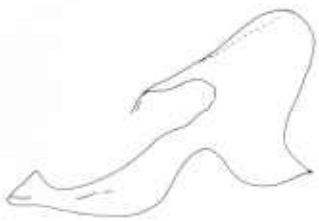


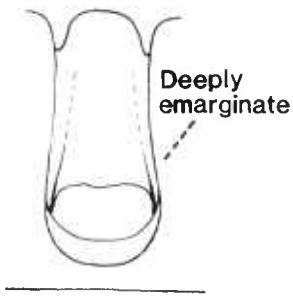


Pseudexentera spoliana (Clemens)

Forewing 7.0 to 9.0 mm long, variable pattern; dark markings brownish black. Limits of variation shown. Adults captured March 1–May 30. MI, WI. Univoltine. Larva feeds in rolled *Quercus* leaves. Syst and Biol: Miller (1986b).
(59 N, 9 Gm, 16 Gf, T)

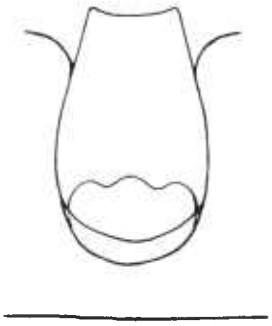






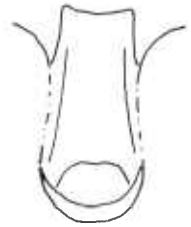
Pseudexentera mali Freeman

Forewing 7.0 to 8.0 mm long, variable pattern; pale areas brown or brownish gray. Limits of variation shown. Adults captured April 6–May 5. MI, WI. Univoltine. Larva feeds in buds, folded leaves, and young fruits of *Pyrus*, *Crataegus*. Syst: Freeman (1942). Biol: Chapman and Lienk (1971).
(13 N, 5 Gm, 6 Gf, T)



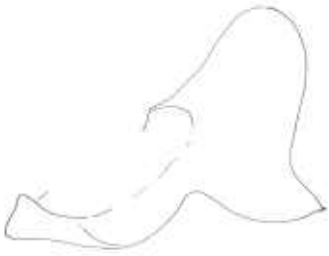
Pseudexentera oregonana (Walsingham)

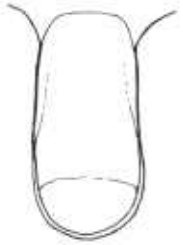
Forewing 7.5 to 9.5 mm long, variable pattern; pale areas grayish brown. Limits of variation shown. Adults captured March 26–May 30. MI, WI. Univoltine. Larva feeds in rolled leaves of *Populus tremuloides, Salix*. Syst: Miller (1986b). Biol: Wong and Melvin (1967).
(31 N, 5 Gm, 2 Gf, T, bottom photo specimen Aweme, MB)



Pseudexentera kalmiana McDunnough

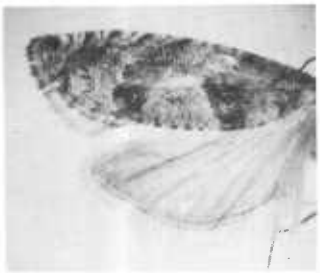
Forewing 5.5 to 6.0 mm long, dark areas dark grayish brown. Adults captured May 3–25. MI. Larva feeds on *Kalmia*. Syst and Biol: Miller (1986b).
(7 N, 4 Gm, 3 Gf, T)

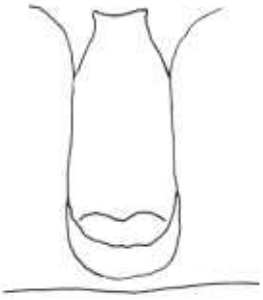




Pseudexentera maracana (Kearfott)

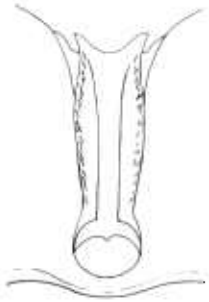
Forewing 7.0 to 7.5 mm long, dark markings dark grayish brown or brownish black. Adults captured April 2–May 15. MI, MN. Larva feeds on *Crataegus*. Syst and Biol: Miller (1986b).
(8 N, 3 Gm, 5 Gf, T)





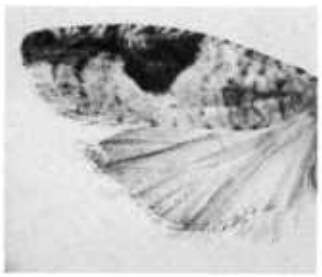
Pseudexentera vaccinii Miller

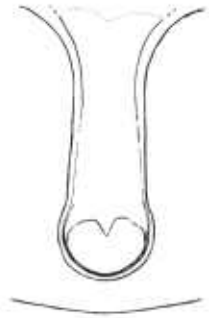
Forewing 6.5 to 8.0 mm long, dark markings grayish brown. Adults captured April 8–May 25. MI, MN. Larva feeds on *Vaccinium*. Syst and Biol: Miller (1986b).
(19 N, 10 Gm, 8 Gf, T)



Pseudexentera costomaculana (Clemens)

Forewing 7.0 to 9.5 mm long, pale areas orange yellow. Adults captured April 23–July 18. MI. Larva feeds in terminals and folded leaves of *Hamamelis*. Syst and Biol: Miller (1986b).
(28 N, 4 Gm, 4 Gf, T)





Pseudexentera virginiana (Clemens)

Forewing 7.5 to 9.0 mm long, pale areas yellowish brown. Adults captured March 25–May 11. MI. Syst: Miller (1986b).
(25 N, 4 Gm, 3 Gf)

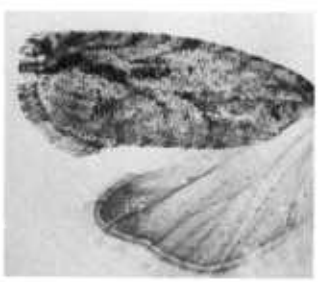
Genus *Gretchena*

Both sexes. Forewing with raised scale tufts near dorsal margin, apex not falcate, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 not united, M_2 and M_3 not connate, M_2, M_3, and Cu_1 approximate at termen, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus not developed; socius not finger- or ribbonlike; valva not divided, sacculus densely clothed with spinelike setae, without rudimentary clasper, outer surface lacking spinelike setae.

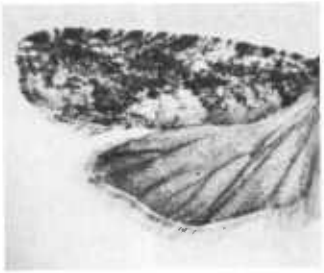
Female. Sternum 7 inflected and overlapping ostium bursae, without median bilobed projection. Ductus bursae sclerotized near middle; corpus bursae without sclerotized sides, with two thornlike signa.

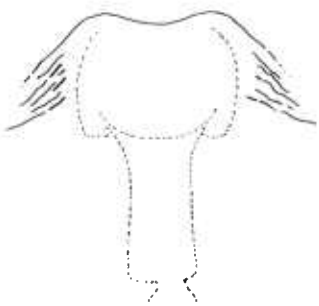
Comments. Eleven Nearctic species of *Gretchena* are known. Brown (1982) gives a generic diagnosis.



Gretchena deludana (Clemens)

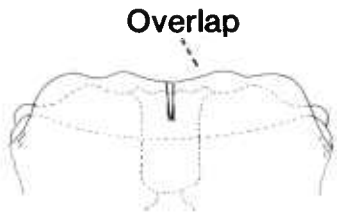
Forewing 7.0 to 8.0 mm long, dark markings brownish black. Adults captured May 6–31. MI. Syst: Heinrich (1923b).
(21 N, 5 Gm, 3 Gf)





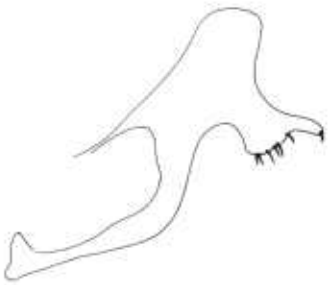
Gretchena concubitana Heinrich

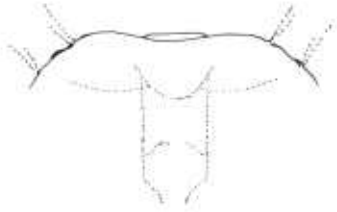
Forewing 7.0 to 9.0 mm long, dark markings brownish black. Adults captured May 4–June 3. MI. Larva feeds on *Carya*. Syst and Biol: Heinrich (1923b). (17 N, 5 Gm, 7 Gf, T)



Gretchena watchungana (Kearfott)

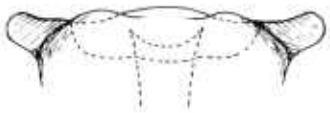
Forewing 5.5 to 8.0 mm long, dark markings brownish black. Adults captured April 26–June 7. MI, WI, MN. Larva feeds on *Alnus*. Syst: Heinrich (1923b). Biol: Krauth *et al.* (1977). (37 N, 9 Gm, 7 Gf, T)





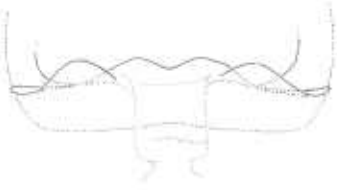
Gretchena bolliana (Slingerland). Pecan bud moth

Forewing 7.5 to 8.5 mm long, dark areas and markings black or brownish black. Adults captured June 25–October 4. MI, MN. Larva feeds on buds, foliage, and fruits of *Carya illinoensis, Juglans*. Syst: Heinrich (1923b). Biol: Moznette *et al.* (1931). (6 N, 4 Gm, 1 Gf, T)



Gretchena amatana Heinrich

Forewing 7.5 to 8.5 mm long, dark areas and markings brownish black. Adults captured May 11–August 3. MI, WI. Syst: Heinrich (1923b). (14 N, 6 Gm, 4 Gf, T)



Gretchena delicatana Heinrich

Forewing 7.0 to 8.0 mm long, dark areas and markings brownish black. Adults captured May 6–June 19. MI, WI, MN. Syst: Heinrich (1923b). (15 N, 6 Gm, 5 Gf, T)

Genus *Rhopobota*

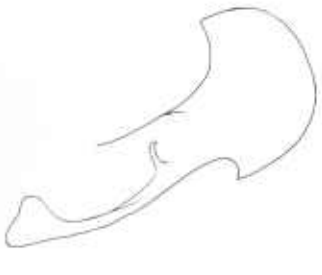
Both sexes. Forewing without raised scale tufts, termen concave, apex not falcate, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_2 and R_3, R_4 and R_5 not connate, M_2 and M_3 not connate, M_2, M_3, and Cu_1 approximate at termen. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

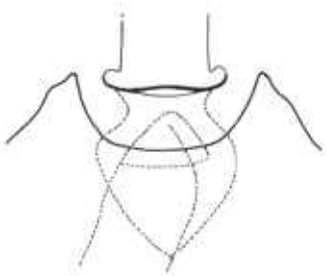
Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus bifurcate; socius present; valva not divided, without thick spinelike seta on cucullus at lower margin.

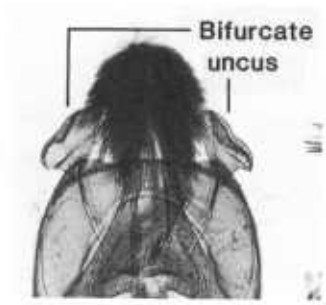
Female. Sternum 7 neither inflected nor overlapping ostium bursae. Corpus bursae with sides sclerotized, with two thornlike signa.

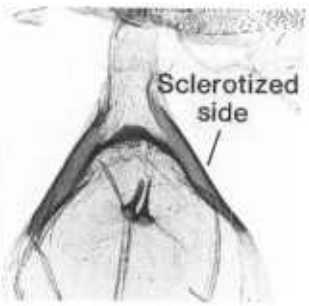
Comments. Three Nearctic species of *Rhopobota* are known. Among the species treated here, *R. naevana* also occurs in the Palearctic.

Brown (1983) gives a synopsis of the genus.



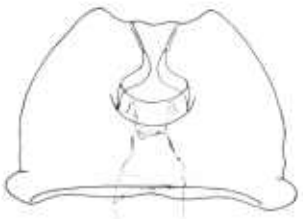






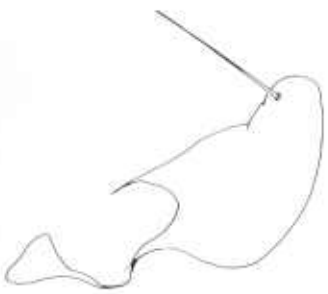
Rhopobota naevana (Hübner). Blackheaded fireworm

Forewing 5.0 to 7.0 mm long, dark markings brownish black or grayish brown. Adults captured May 27–August 24. MI, WI. Multivoltine. Larva feeds on *Vaccinium* buds, leaves, flowers, and fruit. Syst: Brown (1983). Biol: Plank (1922).
(17 N, 5 Gm, 11 Gf)



Rhopobota dietziana (Kearfott)

Forewing 5.5 to 6.0 mm long, dark markings brownish black. Adults captured May 28–August 12. MI. Larva feeds on *Ilex* leaves. Syst: Brown (1983). Biol: Ferguson (1975).
(4 N, 2 Gm, 1 Gf, T)



Rhopobota finitimana (Heinrich)

Forewing 4.5 to 5.0 mm long, dark areas and markings brownish black. Adults captured June 12–21. MI. Larva feeds on leaves of *Nemopanthus mucronata, Ilex*. Syst: Brown (1983). Biol: Ferguson (1975).
(7 N, 2 Gm, 5 Gf, T)

Genus *Epinotia*

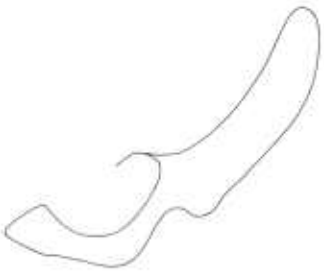
Both sexes. Forewing apex not falcate, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 not united, M_2 and M_3 not connate. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

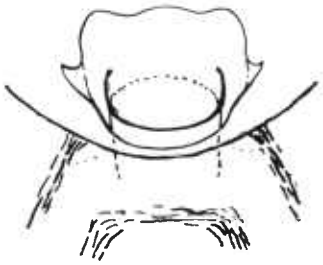
Male. Antenna not notched near base. Hindwing without upper-surface melanic sex scaling. Uncus developed; socius not finger- or ribbonlike; valva not divided, sacculus densely spined, without rudimentary clasper, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin; anellus tightly surrounding aedeagus.

Female. Sternum 7 neither inflected nor overlapping ostium bursae. Lamella antevaginalis not conical. Ductus bursae sclerotized near middle; corpus bursae without sclerotized sides, with two thorn- or finlike signa.

Comments. More than 75 Nearctic species of *Epinotia* are known. Among the species treated here, *E. solandriana, E. nisella, E. cruciana,* and *E. nanana* also occur in the Palearctic.

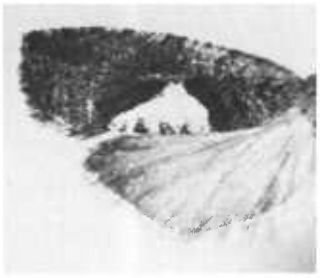
Brown (1980a, 1986) gives a generic treatment.

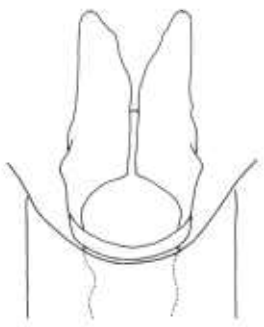




Epinotia solandriana (Linnaeus)

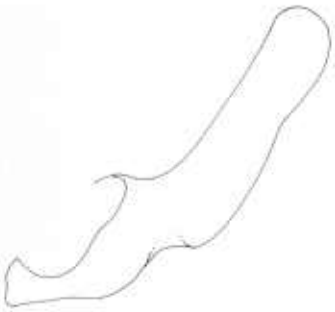
Forewing 8.0 to 10.5 mm long, variable pattern; dark areas and markings brown, grayish brown, or brownish black. Common variants shown. Adults captured July 5–September 5. MI, WI, MN. Univoltine. Larva feeds in rolled leaves of *Betula, Populus, Alnus*, others. Syst: Robinson and Nielsen (1983). Biol: Lindquist and Macleod (1967). (56 N, 3 Gm, 13 Gf)

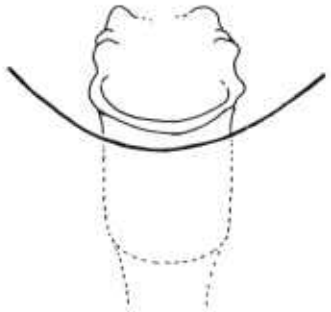




*Epinotia mediovirida*na (Kearfott)

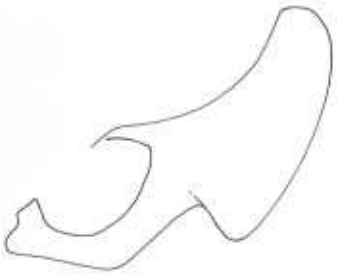
Forewing 7.0 to 8.0 mm long, pale areas green. Adults captured August 10–September 8. MI, WI. Larva feeds in tied *Rubus* leaves. Syst: Brown (1980a). Biol: MacKay (1953). (4 N, 1 Gm, 2 Gf, T)

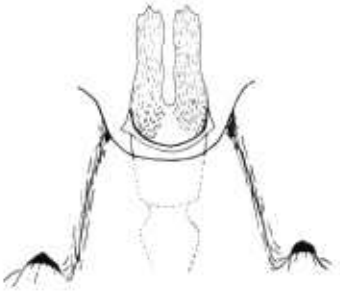




Epinotia radicana (Heinrich)

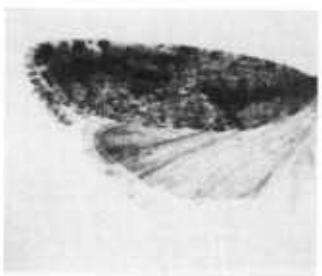
Forewing 7.0 mm long, dark markings brown. Adults captured June 24–25. MN. Univoltine. Larva feeds on foliage of *Picea glauca, P. mariana, Abies balsamea*, others. Syst: Brown (1983). Biol: Blais (1961).
(2 N, 1 Gm, 1 Gf)

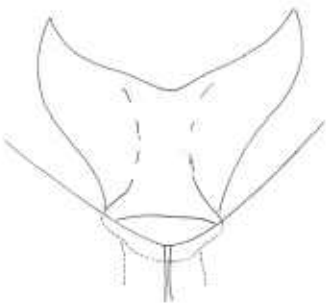




Epinotia madderana (Kearfott)

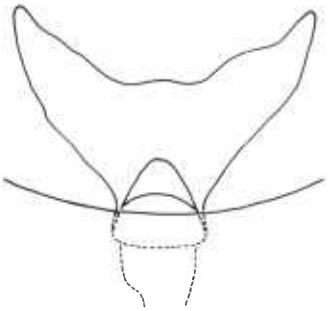
Forewing 6.0 to 6.5 mm long, terminal markings brown. Adults captured June 24–July 15. MI, MN. Syst: Brown (1980a).
(7 N, 2 Gm, 2 Gf, T)





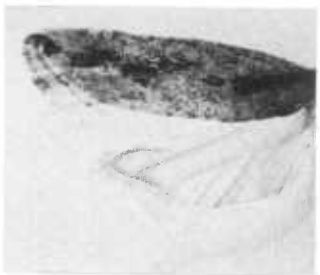
Epinotia laracana (Kearfott)

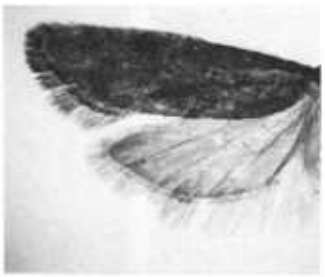
Forewing 6.5 to 7.5 mm long, dark areas and markings brownish black. Adults captured April 20–May 20. MI, WI. Larva feeds on *Celtis*. Syst and Biol: Brown (1986).
(17 N, 2 Gm, 15 Gf)

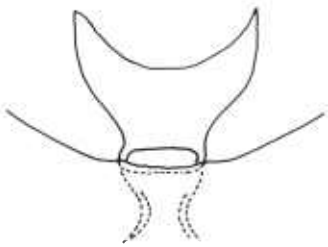


Epinotia zandana (Kearfott)

Forewing 6.0 to 8.0 mm long, variable pattern; dark markings brownish black. Common variants shown. Adults captured March 23–April 21. MI. Larva feeds on *Crataegus*. Syst and Biol: Brown (1986).
(25 N, 9 Gm, 12 Gf, T)

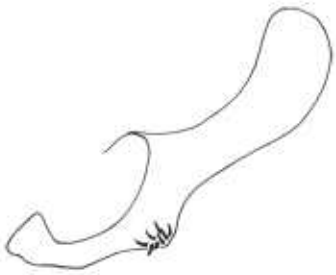
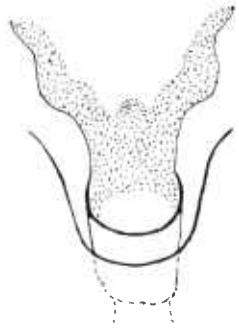






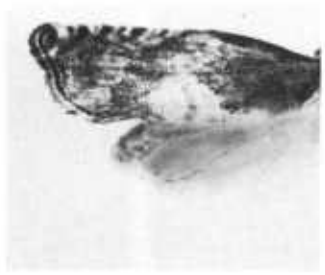
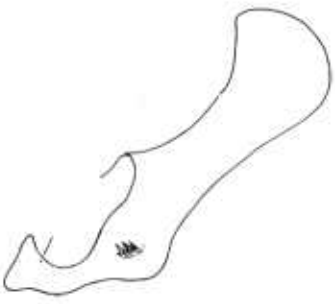
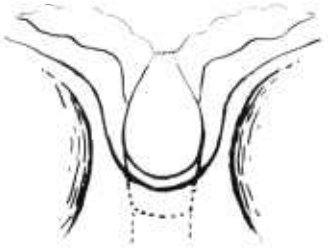
Epinotia vertumnana (Zeller)

Forewing 6.0 to 7.0 mm long, grayish yellowish brown. Adults captured March 23–April 26. MI. Larva feeds on *Crataegus*. Syst and Biol: Brown (1986).
(31 N, 25 Gm, 6 Gf)

Epinotia corylana McDunnough

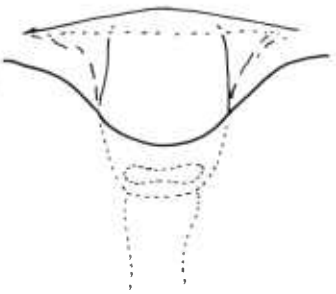
Forewing 5.0 to 6.5 mm long, dark markings yellowish brown, brown, or brownish black. Adults captured May 31–August 14. MI, MN. Larva feeds in *Corylus* catkins. Syst: McDunnough (1925a). Biol: MacKay (1959).
(11 N, 7 Gm, 4 Gf, T, photo specimen Victoria Co., ON)

Epinotia solicitana (Walker)

Forewing 5.5 to 7.0 mm long, dark markings grayish brown or brownish black. Adults captured May 21–August 16. MI, WI, MN. Univoltine. Larva feeds in terminals or folded leaves of *Betula papyrifera, P. populifolia*. Syst: Brown (1980a). Biol: Smith (1946).
(34 N, 12 Gm, 9 Gf, T)

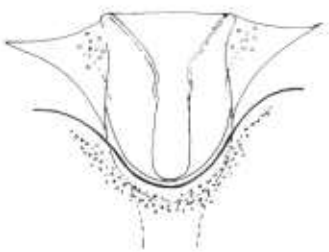




Epinotia nisella (Clerck)

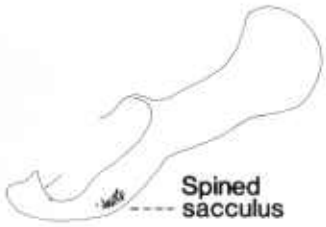
Forewing 6.0 to 7.5 mm long, variable pattern; dark markings grayish brown or brownish black, sometimes orange in dorsal area. Adults captured July 26. MN. Larva feeds in female catkins and terminals of *Populus tremuloides* and *P. balsamifera*, respectively. Syst: Robinson and Nielsen (1983). Biol: Miller (1986a).
(16 N, 2 Gm, 3 Gf)

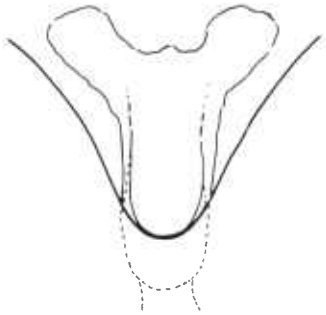




Epinotia criddleana (Kearfott)

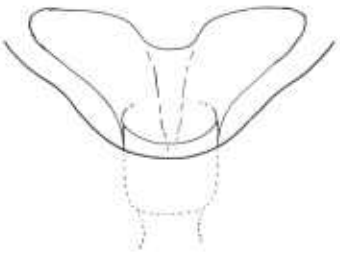
Forewing 6.5 to 7.5 mm long, variable pattern; dark markings gray or brownish black, sometimes orange in dorsal area. Adults captured July 18–August 26. MI, MN. Larva feeds in buds and tied leaves of *Populus, Salix, Quercus*. Syst and Biol: Kusch (1967).
(10 N, 2 Gm, 5 Gf, T)





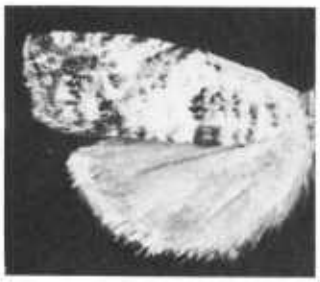
Epinotia transmissana (Walker)

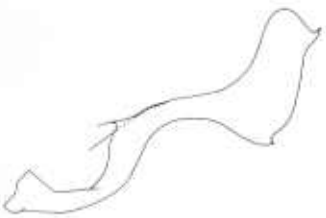
Forewing 6.0 to 8.0 mm long, dark areas grayish yellowish brown, grayish brown, or brownish black. Adults captured June 16–August 4. MI, WI, MN. Larva feeds on *Salix*. Syst: Brown (1980a). Biol: Prentice (1966).
(26 N, 8 Gm, 7 Gf, T)

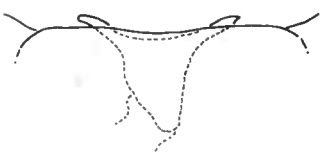


Epinotia momonana (Kearfott)

Forewing 5.5 to 6.5 mm long, dark markings grayish brown or brownish black. Adults captured July 4–September 5. MI, WI, MN. Larva feeds on *Pic*ea. Syst: McDunnough (1935). Biol: Heinrich (1923b).
(11 N, 5 Gm, 6 Gf, T)

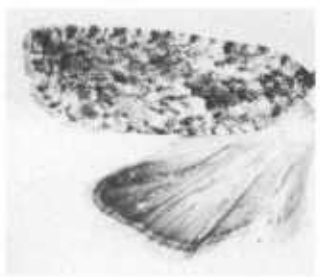






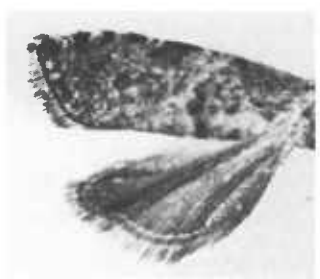
Epinotia huroniensis Brown

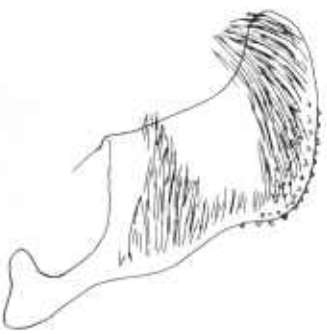
Forewing 6.0 mm long, dark markings grayish brown or brownish black. Adults captured July 2–August 2. MI, MN. Syst: Brown (1980b).
(7 N, 5 Gm, 1 Gf)

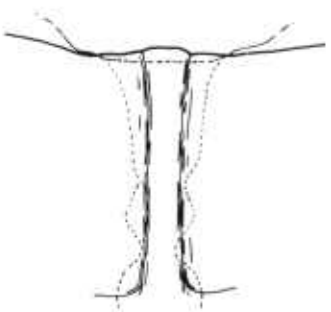


Epinotia nonana (Kearfott)

Forewing 8.5 to 11.0 mm long, dark markings grayish brown or brownish black. Adults captured August 3–October 1. MI, MN. Syst: Heinrich (1929).
(34 N, 6 Gm, 3 Gf, T)

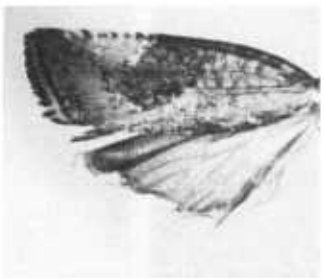


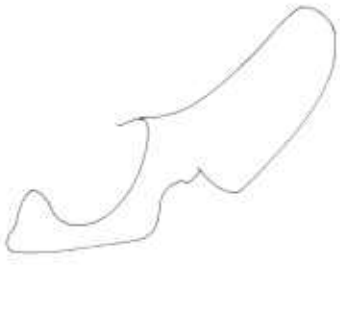


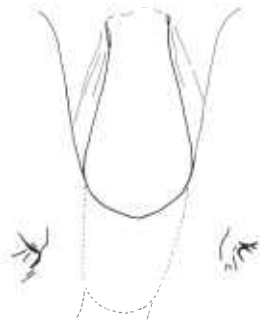


Epinotia nanana (Treitschke)

Forewing 4.5 to 5.0 mm long, dark markings grayish yellowish brown or brownish black. Adults captured April 30–June 13. MI, WI. Univoltine. Larva feeds in *Picea* needles. Syst: Kuznetsov (1986). Biol: Daviault and Ducharme (1966).
(76 N, 6 Gm, 4 Gf)

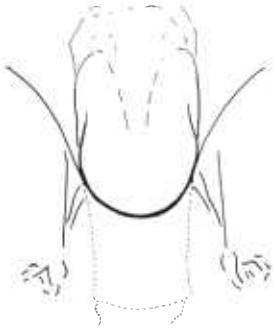






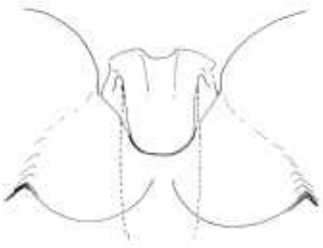
Epinotia medioplagata (Walsingham)

Forewing 5.5 to 7.5 mm long, dark markings brown. Adults captured July 16. MI, WI, MN. Larva feeds in rolled *Salix* leaves. Syst: Brown (1980a). Biol: Prentice (1966).
(3 N, 2 Gm, 1 Gf, T)



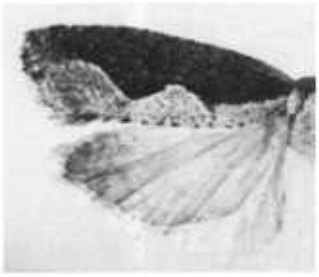
Epinotia cruciana (Linnaeus)

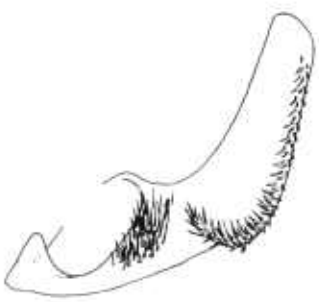
Forewing 5.0 to 5.5 mm long, dark areas brown. No capture dates. MN. Larva feeds in tied *Salix* leaves. Syst: Robinson and Nielsen (1983). Biol: Prentice (1966).
(7 N, 2 Gm, 2 Gf)



Epinotia septemberana (Kearfott)

Forewing 7.5 mm long, dark areas brownish orange or brown. Adult captured August 23. MN. Larva feeds on *Rhododendron, Ledum groenlandicum*. Syst: Brown (1980a). Biol: Ferguson (1975).
(1 N, 1 Gm, photo specimen Hancock Co., ME)





Epinotia lindana (Fernald)

Forewing 7.5 to 9.0 mm long, dark areas grayish brown or brownish black. Adults captured August 25–October 12. MI, WI, MN. Larva feeds in tied leaves of *Cornus*. Syst: Brown (1980a). Biol: McDunnough (1933).
(32 N, 3 Gm, 3 Gf, T)

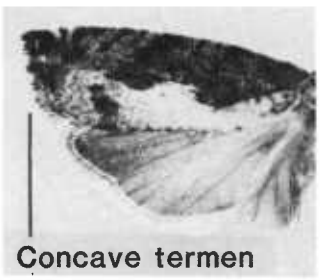
Genus *Catastega*

Both sexes. Forewing termen concave, apex not falcate, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate or approximate, M_2 and M_3 approximate at base, M_2, M_3, and Cu_1 not approximate at termen. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus bifid; socius not finger- or ribbonlike; valva not divided, sacculus densely clothed with spinelike setae, without rudimentary clasper, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin; anellus loosely surrounding aedeagus.

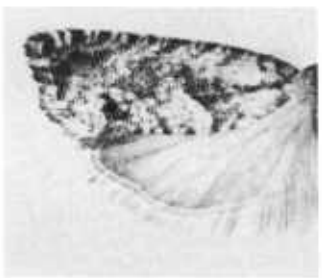
Female. Sternum 7 neither inflected nor overlapping ostium bursae. Lamella antevaginalis conical; lamella postvaginalis absent. Ductus bursae sclerotized one-third its length from genital opening; corpus bursae without sclerotized sides, with two thorn- or finlike signa.

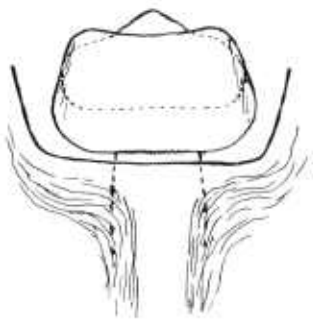
Comments. Three Nearctic species of *Catastega* are known. Brown (1980a, 1986) gives a generic treatment.



Catastega timidella Clemens

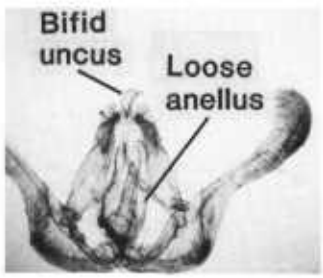
Forewing 7.0 to 9.0 mm long, dark markings grayish brown or brownish black. Adults captured May 13–July 10. MI, WI, MN. Larva feeds in serpentine tube on underside of *Quercus, Juglans, Betula* leaves. Syst: Brown (1986). Biol: Prentice (1966).
(39 N, 9 Gm, 5 Gf)





Catastega aceriella Clemens. Maple trumpet skeletonizer

Forewing 6.5 to 8.5 mm long, dark markings grayish brown or brownish black. Adults captured May 20–July 20. MI, WI, MN. Univoltine. Larva feeds in serpentine tube on underside of leaves of *Acer, Crataegus, Fagus grandifolia*. Syst: Brown (1986). Biol: Côté and Allen (1973).
(41 N, 14 Gm, 7 Gf)



Genus *Ancylis*

Both sexes. Forewing without raised scale tufts, apex falcate, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate, M_2 and M_3 not connate, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked or united.

Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Socius present, not finger- or ribbonlike; valva not divided, without rudimentary clasper, sacculus not densely clothed with spinelike setae, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin.

Female. Sternum 7 not deeply emarginate around ostium bursae, neither inflected nor overlapping ostium bursae. Lamella antevaginalis not conical. Ductus bursae sclerotized less than two-thirds its length from genital opening; corpus bursae without sclerotized sides, with two bladelike signa.

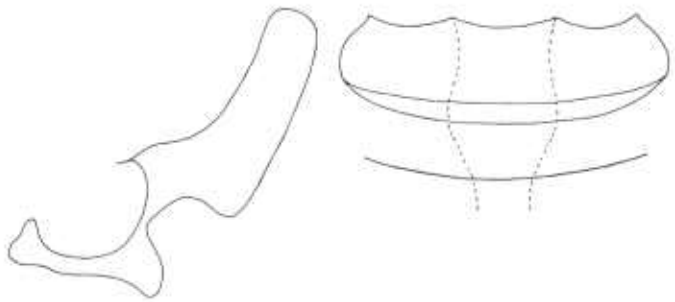
Comments. In the former *Anchylopera* species (Heinrich 1923b), hindwing M_3 and Cu_1 are united; in the remaining *Ancylis* species, these veins are stalked.

More than 30 Nearctic species of *Ancylis* are known. Among the species treated here, the following also occur in the Palearctic: *A. comptana, A. diminutana, A. unguicella,* and *A. tineana.*

I was unable to confirm Heinrich's (1923b) report of *Ancylis goodelliana* (Fernald) in the region.

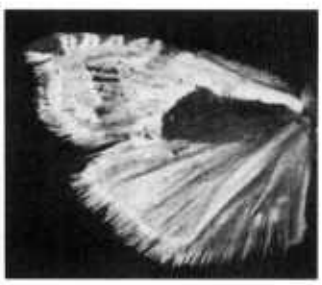
The *A. subaequana* complex here includes *A. galeamatana* (McDunnough) and *A. sheppardana* (McDunnough). The latter two are based on slightly differing specimens from one locality each (McDunnough 1956). The range of variability among representatives of the complex in this study made it difficult to rule out any constituent species.

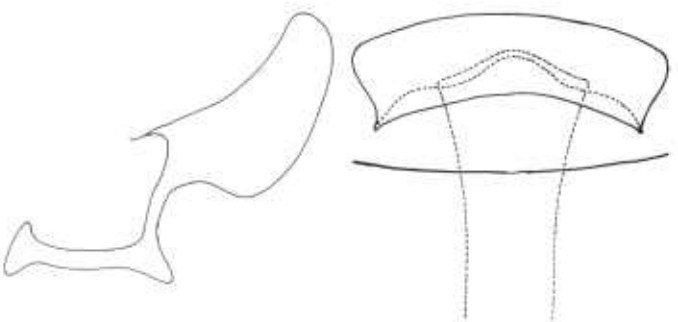
The *A. burgessiana* complex here includes *A. laciniana* (Zeller) and *A. spiraeifoliana* (Clemens). Species limits in this group are ill defined at present, and identities of the latter two rely heavily on host data (McDunnough 1955). Host data were lacking for representatives of the complex in the Michigan-Wisconsin-Minnesota sample, and I could not satisfactorily distinguish the constituent species.



Ancylis nubeculana (Clemens)

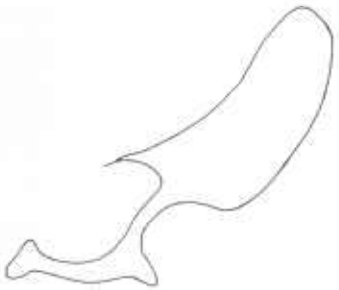
Forewing 7.0 to 8.0 mm long, dark dorsal area grayish brown or brownish black. Adults captured April 24–July 5. MI, WI. Univoltine. Larva feeds in folded leaves of *Pyrus, Amelanchier, Crataegus,* others. Syst: Heinrich (1923b). Biol: Chapman and Lienk (1971). (36 N, 4 Gm, 3 Gf, T)

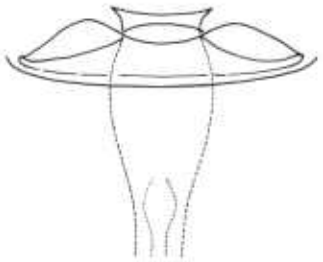


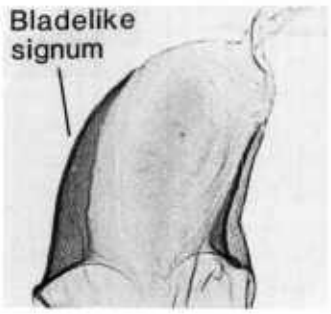


Ancylis subaequana (Zeller) complex

Forewing 6.0 to 7.5 mm long, dorsal spot brownish black. Male vesica long, subequal in length to valva. Adults captured May 20–August 3. MI, WI, MN. Syst: McDunnough (1956). (67 N, 13 Gm, 4 Gf, T)

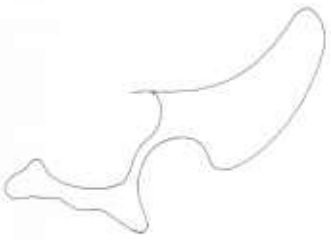


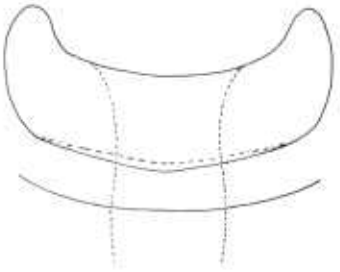




Ancylis metamelana (Walker)

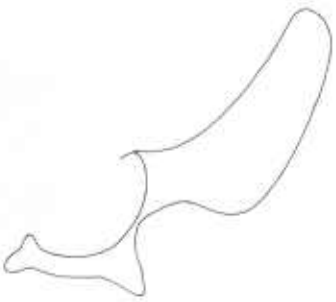
Forewing 4.5 to 5.5 mm long, dark areas yellowish brown or brownish black. Female ductus bursae not sclerotized. Adults captured May 8–September 2. MI, WI. Multivotine. Larva feeds in folded or tied leaves of *Trifolium repens, T. pratense, T. hybridum*. Syst: McDunnough (1955). Biol: Wehrle (1929). (51 N, 4 Gm, 6 Gf, T)

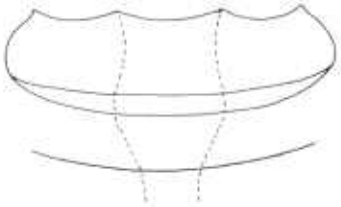




Ancylis semiovana (Zeller)

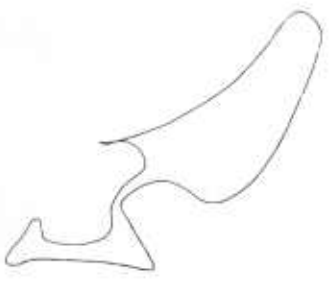
Forewing 6.5 to 7.5 mm long, dark areas brownish black. Adults captured May 29–August 30. MI, MN. Larva feeds on *Ceanothus*. Syst: Heinrich (1923b). Biol: MacKay (1959). (46 N, 3 Gm, 2 Gf, T)

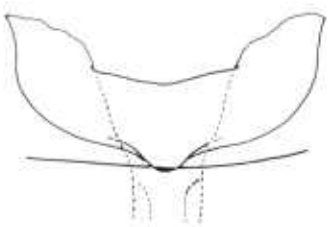




Ancylis burgessiana (Zeller) complex

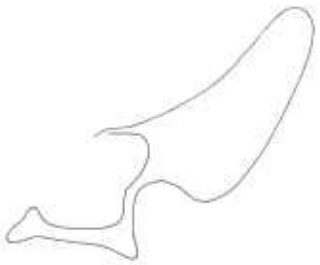
Forewing 5.5 to 8.0 mm long, dorsal spot brown. Adults captured May 22–July 31. MI, WI, MN. Larva feeds in folded leaves of *Quercus, Corylus, Prunus*. Syst: Heinrich (1923b). Biol: Prentice (1966). (117 N, 11 Gm, 8 Gf, T)

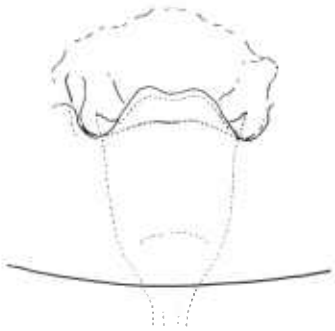




Ancylis platanana (Clemens)

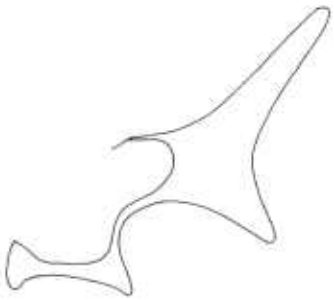
Forewing 7.5 mm long, unmarked areas orange yellow. Adult captured June 13. MI. Larva feeds on *Platanus occidentalis* leaves. Syst: Heinrich (1923b). Biol: Denmark (1960). (1 N, 1 Gm, T)

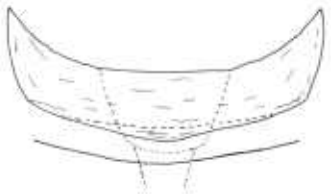




Ancylis comptana (Frölich).
Strawberry leafroller

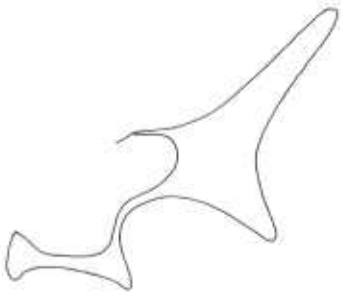
Forewing 4.5 to 7.0 mm long, dark areas grayish brown, yellowish brown, or brownish black. Adults captured May 3–August 8. MI, WI, MN. Multivoltine. Larva feeds in folded *Fragaria, Rubus* leaves. Syst: Miller (1973b). Biol: Neiswander (1944).
(39 N, 8 Gm, 5 Gf)

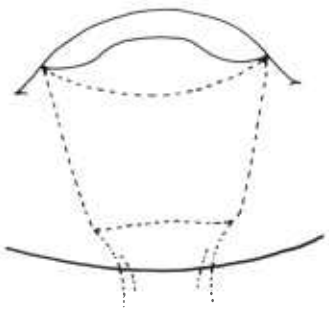




Ancylis divisana (Walker)

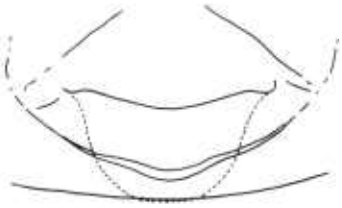
Forewing 4.5 to 7.0 mm long, dark areas reddish brown. Female ductus bursae not sclerotized. Adults captured June 4–August 7. MI, WI. Larva feeds in rolled leaves of *Quercus, Platanus occidentalis*. Syst: Heinrich (1923b). Biol: Forbes (1923).
(9 N, 2 Gm, 2 Gf, T)





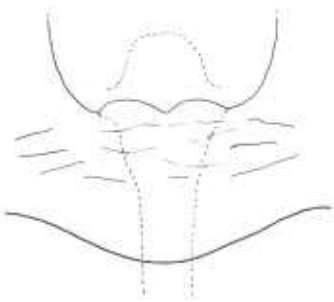
Ancylis apicana (Walker)

Forewing 4.5 to 7.0 mm long, dark areas grayish reddish brown. Female ductus bursae not sclerotized. Adults captured May 19–June 24. MI, WI, MN. Larva feeds in folded leaves of *Rubus, Pyrus, Betula*, others. Syst: Heinrich (1923b). Biol: Chapman and Lienk (1971).
(21 N, 2 Gm, 4 Gf, T)



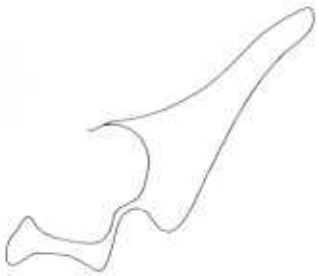
Ancylis muricana (Walsingham)

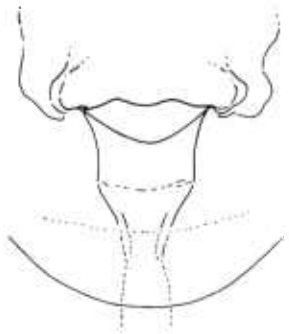
Forewing 4.0 mm long, dark basal area grayish reddish brown. Female ductus bursae not sclerotized. Adult captured July 20. MI. Larva feeds on *Fragaria, Cornus, Rubus*, others. Syst: Heinrich (1923b). Biol: Putman (1942).
(1 N, 1 Gm, T, photo specimen Erie Co., NY)



Ancylis carbonana Heinrich

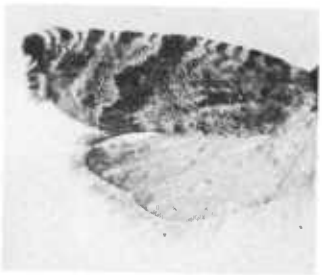
Forewing 6.0 to 6.5 mm long, dark areas grayish brown. Adults captured May 23–June 21. MI. Syst: Heinrich (1923b).
(8 N, 5 Gm, 1 Gf, T)

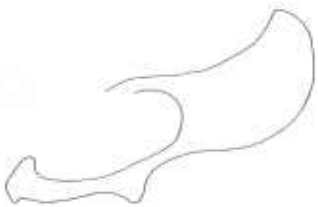


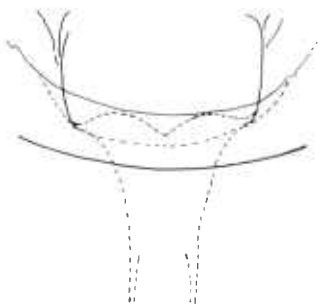


Ancylis diminutana (Haworth)

Forewing 6.0 to 8.0 mm long, dark areas yellowish brown or grayish yellowish brown. Female ductus bursae not sclerotized. Adults captured May 20–August 18. MI, WI. Larva feeds on *Salix*. Syst: Heinrich (1923b). Biol: MacKay (1959).
(13 N, 5 Gm, 3 Gf, photo specimen Jasper Co., MO)

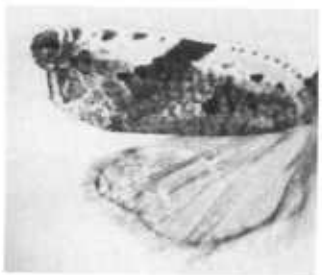


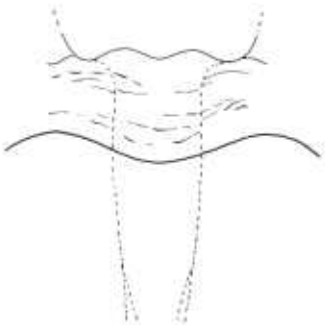




Ancylis unguicella (Linnaeus)

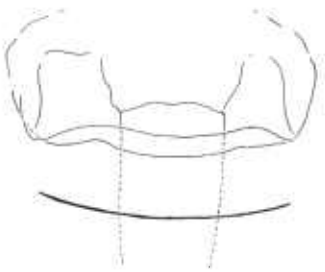
Forewing 6.5 to 8.5 mm long, dark markings yellowish brown, grayish yellowish brown, or brownish black. Adults captured May 18–July 13. MI. Syst: Robinson and Nielsen (1983).
(3 N, 3 Gm)





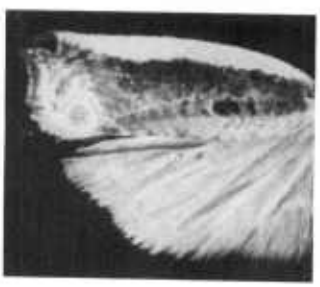
Ancylis mediofasciana (Clemens)

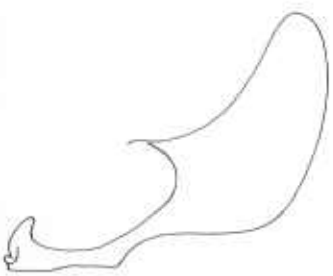
Forewing 7.0 to 9.5 mm long, dark areas and markings yellowish brown, grayish yellowish brown, or brownish black. Female ductus bursae not sclerotized. Adults captured May 20–June 6. MI, MN. Larva feeds in rolled *Pyrus* leaves. Syst: Heinrich (1923b). Biol: Ferguson (1975).
(17 N, 3 Gm, 4 Gf, T)

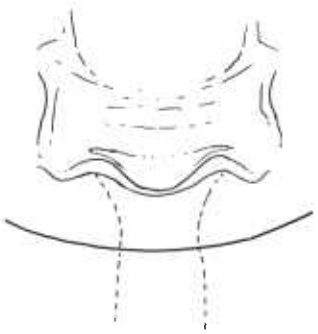


Ancylis tineana (Hübner)

Forewing 6.5 to 7.0 mm long, dark areas yellowish brown or grayish yellowish brown. Adults captured May 20–July 1. MI. Larva feeds on *Populus, Prunus*. Syst: Heinrich (1923b). Biol: Ferguson (1975).
(3 N, 1 Gm, 1 Gf, photo specimen Aweme, MB)







Ancylis albacostana Kearfott

Forewing 7.5 to 8.5 mm long, dark areas grayish brown or brownish black. Adults captured May 29–June 30. MI, MN. Syst: Heinrich (1923b).
(6 N, 2 Gm, T)

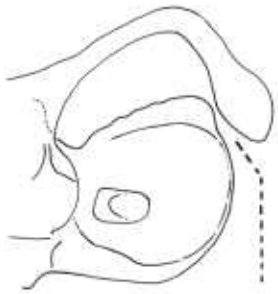
Genus *Hystricophora*

Both sexes. Forewing without raised scale tufts, termen concave, apex not falcate, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_1 and R_2, R_4 and R_5 separate, M_2 and M_3 separate at base, M_2, M_3, and Cu_1 not approximate at termen, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_2 and M_3 approximate, M_3 and Cu_1 stalked.

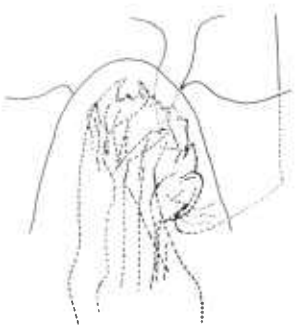
Male. Antenna not notched near base. Forewing without costal fold. Hindwing without upper-surface melanic sex scaling. Uncus developed; socius and hamus absent; valva divided, without rudimentary clasper, outer surface lacking spinelike setae, without thick spinelike seta on cucullus at lower margin.

Female. Sternum 7 inflected and overlapping ostium bursae, without bilobed projection. Ductus bursae sclerotized two-thirds or more of its length from genital opening; corpus bursae without sclerotized sides, without signa.

Comments. More than 10 Nearctic species of *Hystricophora* are known.



Divided valva



Hystricophora vestaliana (Zeller)

Forewing 10.0 mm long, pale areas yellowish white or pale yellow. Adult captured June 30. WI. Syst: Heinrich (1923b). (1 N, 1 Gf, T, photo specimen lectotype)

Tribe Grapholitini

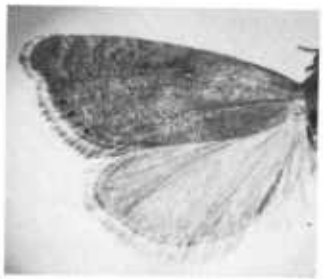
Genus *Dichrorampha*

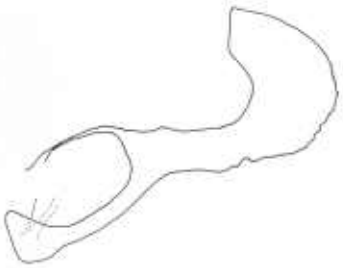
Both sexes. Thorax without posterior tuft. Forewing termen slightly concave, R_1 originating well before middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 separate, cubital vein with pecten, M_3 and Cu_1 connate or stalked.

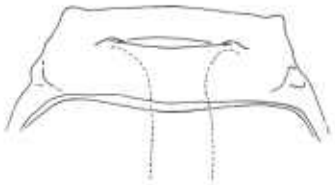
Male. Hindwing inner margin not modified. Hindmost tibia without dilated or tufted scaling. Abdominal segment 8 without paired lateral tufts. Uncus not developed; socius and hamus absent; valva without rudimentary clasper, without thick spinelike seta on cucullus at lower margin; vesica with cornuti.

Female. Sternum 7 neither inflected nor overlapping ostium bursae. Ductus bursae sclerotized one-half or less its length from genital opening; corpus bursae with one thornlike signum.

Comments. Nine Nearctic species of *Dichrorampha* are known. Among the species treated here, *D. sedatana* also occurs in the Palearctic. Part of the genus was reviewed by Miller (1983d).

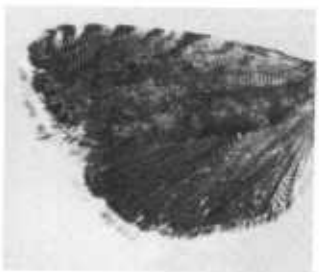


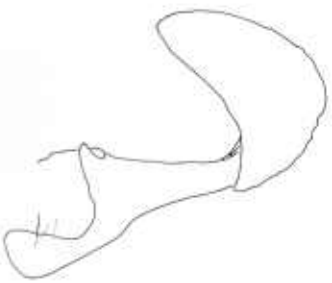


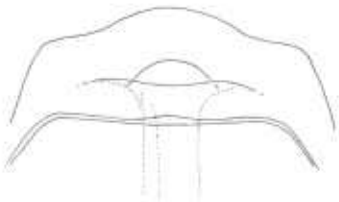


Dichrorampha simulana (Clemens)

Forewing 5.5 to 7.0 mm long, variable pattern; dark areas yellowish brown. Limits of variation shown. Adults captured June 26–August 7. MI, WI, MN. Female tentatively associated. Syst: Miller (1983d).
(3 N, 1 Gm, 2 Gf, T, top photo specimen Moraine Lake, AB, bottom, Lake City, CO)

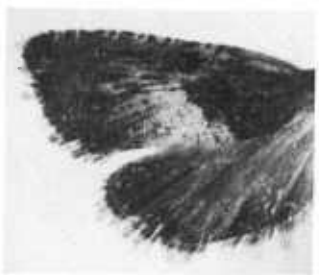


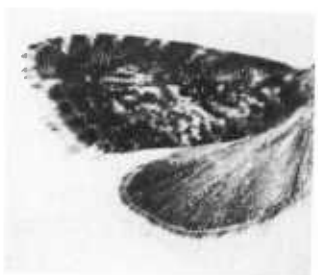


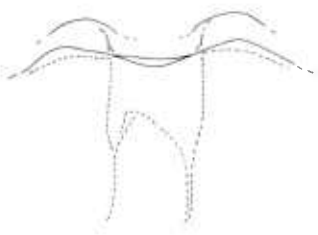


Dichrorampha bittana (Busck)

Forewing 5.0 to 6.5 mm long, variable pattern; dark areas yellowish brown. Limits of variation shown. Adults captured June 25–August 26. MI, WI. Female tentatively associated. Syst: Miller (1983d).
(7 N, 7 Gm, T, bottom photo specimen Grundy Co., MO)

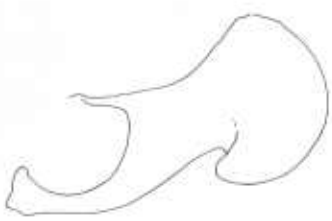


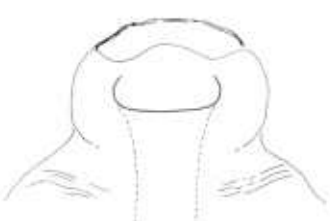




Dichrorampha incanana (Clemens)

Forewing 4.5 to 5.0 mm long, dark areas grayish brown or brownish black. Adults captured July 17–19. MI, WI. Syst: Heinrich (1926).
(2 N, 2 Gm, T, photo specimen Putnam Co., IL)





Dichrorampha sedatana (Busck)

Forewing 5.0 to 6.0 mm long, dark areas yellowish brown. Adults captured June 8–13. MI. Syst: Miller (1983d).
(5 N, 3 Gm, 1 Gf, T)

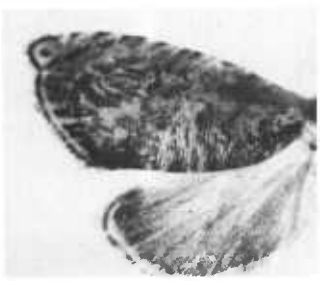
Genus *Talponia*

Both sexes. Thorax without posterior tuft. Forewing termen concave, R_1 originating at or nearer middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 not approximate, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 separate, cubital vein with pecten, M_3 and Cu_1 connate.

Male. Hindwing inner margin not modified. Hindmost tibia without dilated or tufted scaling. Abdominal segment 8 with paired lateral tufts. Uncus not developed; socius present; valva without rudimentary clasper, without thick spinelike seta on cucullus at anal angle; vesica without cornuti.

Female. Sternum 7 inflected and overlapping ostium bursae. Ductus bursae sclerotized only near genital opening; corpus bursae with two thornlike signa.

Comments. *Talponia* appears to be monotypic.



Talponia plummeriana (Busck)

Forewing 5.5 mm long, distal half brown. Adult captured July 8. MI. Larva feeds in *Asiminia* flowers. Syst: Heinrich (1926). Biol: MacKay (1959).
(1 N, 1 Gm, T, photo specimen Clay Co., MO)

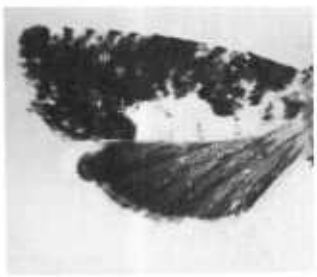
Genus *Pammene*

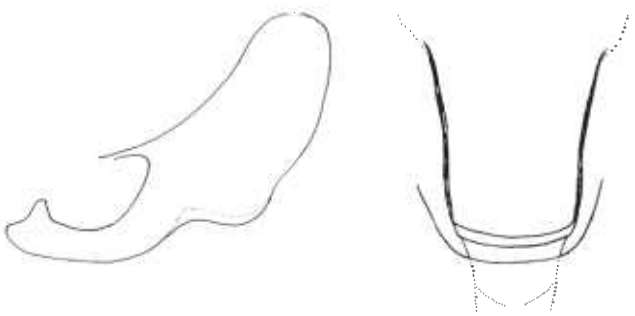
Both sexes. Thorax without posterior tuft. Forewing termen straight or slightly concave, R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, cubital vein with pecten, M_3 and Cu_1 connate or stalked.

Male. Hindwing inner margin not modified. Hindmost tibia without dilated or tufted scaling. Abdominal segments 6 and 7 with modified dorsal hair tufts beneath scaling. Abdominal segment 8 without paired lateral tufts. Uncus not developed; socius and hamus absent; valva without rudimentary clasper, without thick spinelike seta on cucullus at lower margin; vesica with cornuti.

Female. Sternum 7 emarginate posteriorly, neither inflected nor overlapping ostium bursae. Ductus bursae sclerotized one-third its length from genital opening; corpus bursae with two thornlike signa.

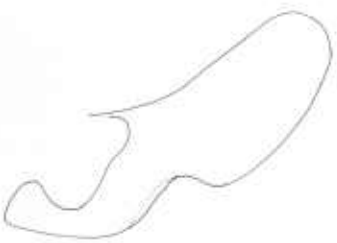
Comments. Five Nearctic species of *Pammene* are known.

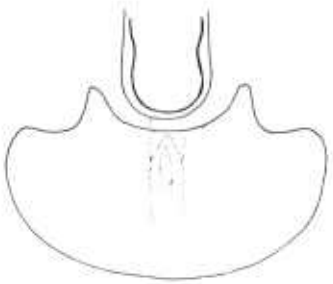




Pammene felicitana (Heinrich)

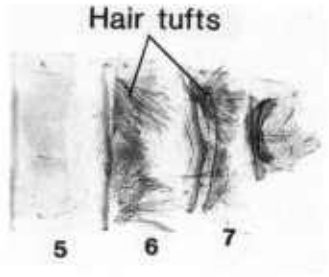
Forewing 5.0 to 6.0 mm long, dark areas grayish yellowish brown or brownish black. Adults captured June 2–12. MI. Syst: Heinrich (1926).
(6 N, 1 Gm, 1 Gf, T)





Pammene perstructana (Walker)

Forewing 4.5 to 7.0 mm long, dark areas grayish yellowish brown or brownish black. Adults captured June 7–August 1. MI, WI, MN. Syst: Miller (1985e). (21 N, 9 Gm, 6 Gf, T)



Genus *Eucosmomorpha*

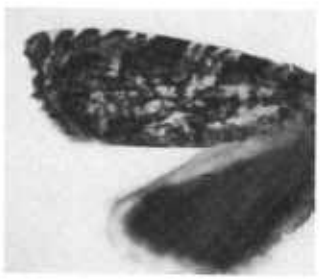
Both sexes. Thorax without posterior tuft. Forewing termen concave, R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 not approximate, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 approximate or connate, cubital vein with pecten, M_3 and Cu_1 approximate or connate.

Male. Hindwing inner margin modified into a sclerotized edge. Hindmost tibia without dilated or tufted scaling. Abdominal segment 8 without paired lateral tufts. Uncus not developed; socius present; valva without rudimentary clasper, with thick spinelike seta on cucullus at lower margin; vesica with cornuti.

Female. Sternum 7 slightly emarginate posteriorly, neither inflected nor overlapping ostium bursae. Ductus bursae sclerotized near middle; corpus bursae with one thornlike signum.

Comments. Only one Nearctic species of *Eucosmomorpha* is known; *E. albersana* also occurs in the Palearctic. Obraztsov (1961) gives a generic treatment.

Placement of *Eucosmomorpha* in the tribe Grapholitini is based on the prevailing venational criteria (Heinrich 1923b, Obraztsov 1958). Use of other characters in determining higher category relations may affect the future placement of this and other genera (Kuznetsov and Stekolnikov 1977).



Eucosmomorpha albersana (Hübner)

Forewing 5.5 mm long, dark markings brown or grayish brown. Adult captured June 2. MI. Syst: Miller (1983c). (1 N, 1 Gm)

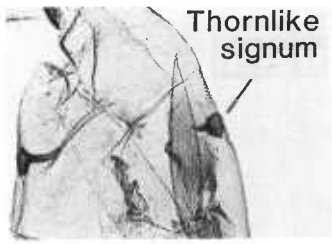
Genus *Larisa*

Both sexes. Thorax without posterior tuft. Forewing termen convex, R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 not approximate, Cu_2 originating at distal two-thirds or between distal two-thirds and three-quarters of discal cell. Hindwing Rs and M_1 stalked, cubital vein with pecten, M_3 and Cu_1 stalked.

Male. Hindwing inner margin not modified. Hindmost tibia without dilated or tufted scaling. Abdominal segment 8 with paired lateral tufts. Uncus developed; hamus present; valva with rudimentary clasper, without thick spinelike seta on cucullus at lower margin; vesica with cornuti.

Female. Sternum 7 emarginate posteriorly, neither inflected nor overlapping ostium bursae. Ductus bursae sclerotized two-thirds its length from genital opening; corpus bursae with two thornlike signa.

Comments. *Larisa* appears to be monotypic. Miller (1978a) gives a generic treatment.



Larisa subsolana Miller

Forewing 4.5 to 5.0 mm long, dark areas brown or brownish black. Adults captured June 12–August 5. MI. Larva feeds on *Carya*. Syst: Miller (1978a). Biol: Brown *et al.* (1983). (4 N, 3 Gm, 1 Gf, T)

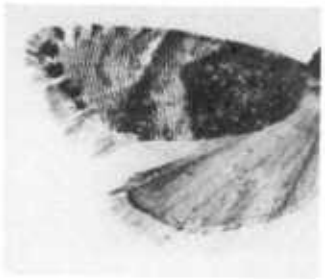
Genus *Sereda*

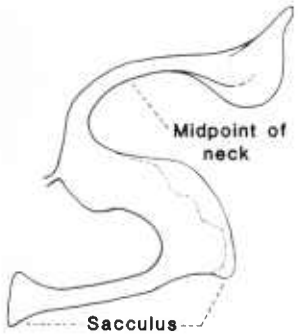
Both sexes. Thorax without posterior tuft. Forewing termen slightly concave, R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, cubital vein without pecten, M_3 and Cu_1 connate.

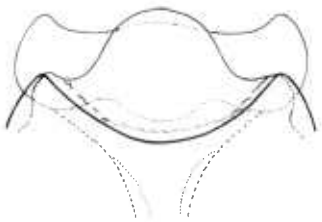
Male. Hindwing inner margin not modified. Hindmost tibia without dilated or tufted scaling. Abdominal segment 8 with paired lateral tufts. Uncus not developed; socius and hamus absent; valva without rudimentary clasper, without thick spinelike seta on cucullus at lower margin, cross-sectional width at midpoint of neck one-eighth or less of lineal sacculus width; vesica with cornuti.

Female. Sternum 7 emarginate posteriorly, neither inflected nor overlapping ostium bursae. Ductus bursae sclerotized two-thirds its length from genital opening; corpus bursae with two thornlike signa.

Comments. *Sereda* appears to be monotypic. The species name *tautana* has usually been mispelled *lautana* (Miller 1973a).







Sereda tautana (Clemens)

Forewing 5.0 to 5.5 mm long, basal half brown. Adults captured April 13–May 23. MI. Larva feeds on *Quercus*. Syst: Heinrich (1926). Biol: Prentice (1966).
(11 N, 5 Gm, 3 Gf, T)

Genus *Grapholita*

Both sexes. Thorax without posterior tuft. Forewing R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, cubital vein with pecten, M_3 and Cu_1 connate or stalked.

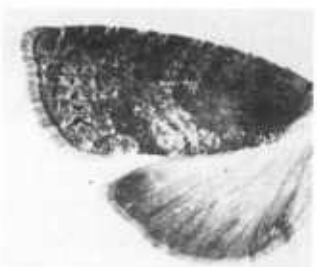
Male. Hindwing inner margin not modified. Hindmost tibia without dilated or tufted scaling. Abdominal segment 8 with paired lateral tufts. Uncus not developed; socius and hamus absent; valva without rudimentary clasper, without thick spinelike seta on cucullus at lower margin; vesica with cornuti.

Female. Sternum 7 neither inflected nor overlapping ostium bursae. Corpus bursae with two thornlike signa or without signa.

Comments. Nearly 20 Nearctic species of *Grapholita* are known. Among the species treated here, *G. molesta* and *G. delineana* also occur in the Palearctic, the former being accidentally introduced to the Nearctic sometime before 1915. The latter is a possible introduction (Miller 1982).

I was unable to confirm Beebe's (1954) report of *G. libertana* Heinrich in the region.

Grapholita packardi is considered a complex here because of diverse habits and hosts (Chapman and Lienk 1971).

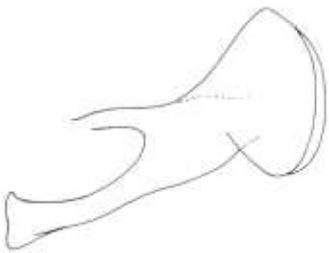


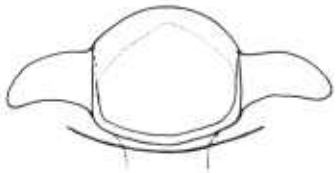
Grapholita molesta (Busck). Oriental fruit moth

Forewing 5.0 to 5.5 mm long, dark areas yellowish brown or grayish yellowish brown. Female corpus bursae with two signa. Adults captured May 6–July 4. MI. Multivoltine. Larva feeds in terminals and fruits of *Prunus, Pyrus, Rosa*, others. Syst: Heinrich (1926). Biol: Chapman and Lienk (1971).
(5 N, 3 Gm, 2 Gf, T, photo specimen Story Co., IA)

Grapholita packardi (Zeller) complex. Cherry fruitworm

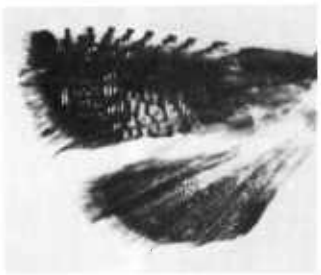
Forewing 4.0 to 5.5 mm long, dark areas yellowish brown or grayish yellowish brown. Female corpus bursae with two signa. Sex scaling on underforewing and upper-hindwing surfaces of male. Adults captured May 23–August 24. MI, WI, MN. Uni- or bivoltine depending on host. Larva feeds in fruits and terminals of *Pyrus, Prunus, Crataegus*, others. Syst: Heinrich (1926). Biol: Balduf (1959).
(37 N, 10 Gm, 8 Gf, T)

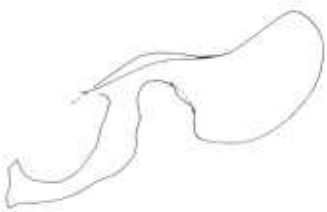


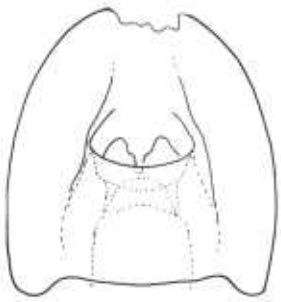


Grapholita prunivora (Walsh). Lesser appleworm

Forewing 4.0 to 5.0 mm long, dark areas yellowish brown or brownish black. Female corpus bursae with two signa. Adults captured May 27–August 11. MI, WI, MN. Bivoltine. Larva feeds in fruits of *Pyrus, Prunus, Crataegus*. Syst: Heinrich (1926). Biol: Chapman and Lienk (1971).
(119 N, 5 Gm, 4 Gf, T)





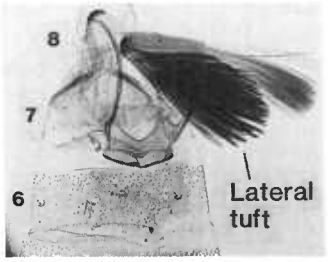


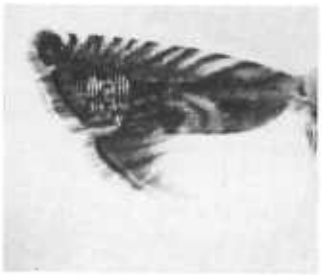
Grapholita angleseana (Kearfott)

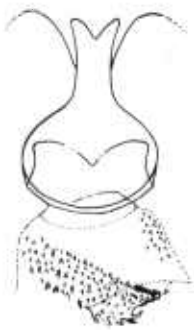
Forewing 5.0 mm long, dark areas and markings grayish yellowish brown or brownish black. Female corpus bursae with two signa. Adult captured June 20. MI. Larva feeds on seeds of *Fragaria*. Syst and Biol: Heinrich (1926).
(1 N, 1 Gm, T)

Grapholita fana (Kearfott)

Forewing 4.5 to 5.0 mm long, dark areas grayish yellowish brown. Female corpus bursae with two signa. Adults captured May 24–June 16. MI. Larva feeds in *Desmodium* buds and flowers. Syst and Biol: Heinrich (1926).
(3 N, 2 Gm, 1 Gf, T)

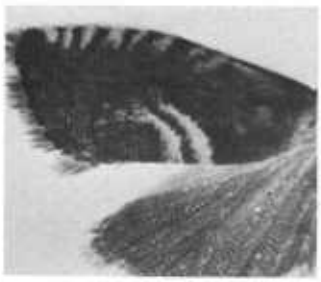


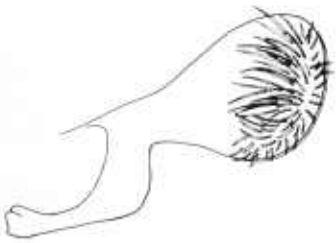


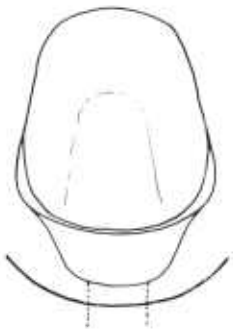


Grapholita eclipsana (Zeller)

Forewing 4.0 to 6.0 mm long, dark areas and markings yellowish brown or brownish black. Female corpus bursae with two signa. Adults captured April 21–June 10. MI, WI, MN. Larva feeds on *Amorpha*. Syst: Heinrich (1926). Biol: Godfrey *et al.* (1987).
(23 N, 6 Gm, 3 Gf, T)

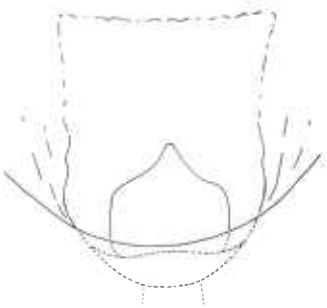






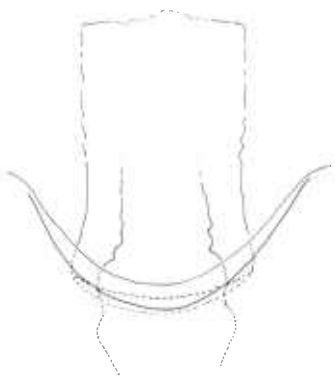
Grapholita interstinctana (Clemens). Clover head caterpillar

Forewing 4.0 to 5.0 mm long, dark areas yellowish brown. Signa absent from female corpus bursae. Adults captured May 30–September 6. MI, WI, MN. Multivoltine. Larva feeds on *Trifolium* heads and leaves. Syst: Heinrich (1926). Biol: Wehrle (1924).
(46 N, 6 Gm, 6 Gf, T)



Grapholita tristrigana (Clemens)

Forewing 4.5 to 6.0 mm long, dark areas grayish yellowish brown. Signa absent from female corpus bursae or no larger than specks. Adults captured May 24–July 3. MI. Larva feeds in seeds and stems of *Baptisia, Lupinus*. Syst and Biol: Miller (1982).
(2 N, 2 Gm, T, photo specimen Gentry Co., MO)



Grapholita delineana Walker

Forewing 4.5 to 6.0 mm long, dark areas grayish yellowish brown. Female corpus bursae with two signa. Adults captured June 19–July 22. WI, MN. Larva feeds in stems and seeds of *Cannabis sativa*. Syst and Biol: Miller (1982).
(13 N, 5 Gm, 2 Gf, photo specimen Putnam Co., IL)

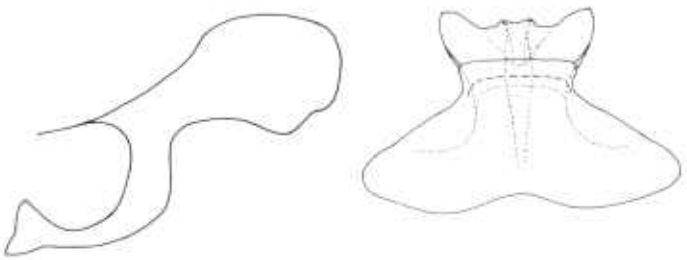
Genus *Corticivora*

Both sexes. Thorax without posterior tuft. Forewing termen slightly convex, R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, R_3 and R_4 approximate, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 stalked, cubital vein with pecten, M_3 and Cu_1 stalked.

Male. Hindwing inner margin not modified. Hindmost tibia without dilated or tufted scaling. Abdominal segment 8 without paired lateral tufts. Uncus not developed; socius present; valva without rudimentary clasper, without thick spinelike seta on cucullus at lower margin; vesica without cornuti.

Female. Sternum 7 inflected and overlapping ostium bursae. Ductus bursae sclerotized one-third its length from genital opening; corpus bursae with two scobinate signa.

Comments. Three Nearctic species of *Corticivora* are known. Brown (1984) gives a generic treatment and reviews the species of *Corticivora.*



Corticivora clarki Clarke

Forewing 4.0 to 5.0 mm long, dark areas grayish yellowish brown. Adults captured July 5–August 10. MI. Larva feeds on *Pinus.* Syst: Brown (1984). Biol: Clarke (1951).
(5 N, 4 Gm, T)

Genus *Cydia*

Both sexes. Thorax without posterior tuft. Forewing R_1 originating at or near middle of discal cell, R_2 originating nearer R_3 than R_1, upper internal vein of discal cell originating between R_1 and R_2, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, M_3 and Cu_1 connate, stalked, or united.

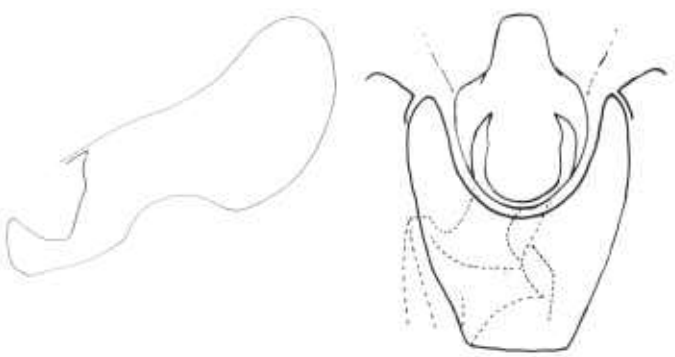
Male. Abdominal segments 6 and 7 without modified dorsal hair tufts beneath scaling. Abdominal segment 8 without paired lateral tufts. Uncus not developed; socius and hamus absent; valva without rudimentary clasper, without thick spinelike seta on cucullus at lower margin.

Female. Sternum 7 emarginate posteriorly or deeply emarginate around ostium bursae, neither inflected nor overlapping ostium bursae. Corpus bursae with two thornlike signa.

Comments. More than 40 Nearctic species of *Cydia* are known. Among the species treated here, *C. pomonella* is cosmopolitan, and *C. rusticella* (formerly *C. nigricana*) and *C. strobilella* occur in the Palearctic. The first two were accidentally introduced to the Nearctic: the former before 1819, the latter before 1900.

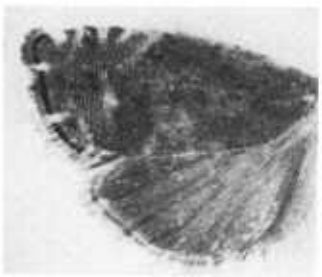
Brown (1983) discusses some generic characters.

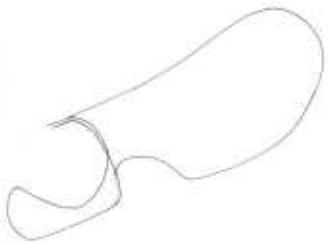
Cydia toreuta and *C. latiferreana* are considered complexes here. The former may consist of different species on different *Pinus* hosts (Abrahamson and Kraft 1965). In the latter, genitalic variation may represent additional but as yet unrecognized species (Brown 1983).

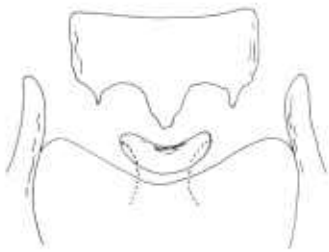


Cydia laricana (Busck)

Forewing 5.0 mm long, dark areas and markings grayish brown or brownish black. Adult captured August 24. WI. Larva feeds beneath *Larix* bark. Syst and Biol: Heinrich (1926).
(1 N, 1 Gm, T, photo specimen Missoula Co., MT)

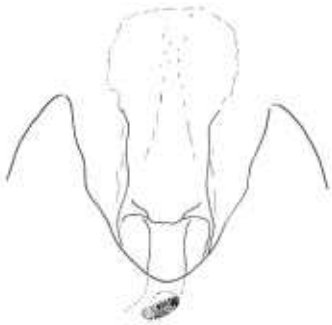






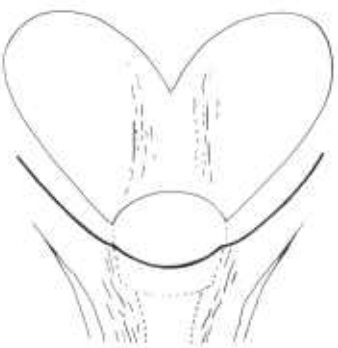
Cydia inopiosa Heinrich

Forewing 4.0 to 5.0 mm long, dark areas and markings grayish brown or brownish black. No capture dates; all adults reared. MI, WI. Larva feeds beneath *Pinus* bark. Syst and Biol: Brown and W.E. Miller (1983).
(17 N, 3 Gm, 5 Gf, T)



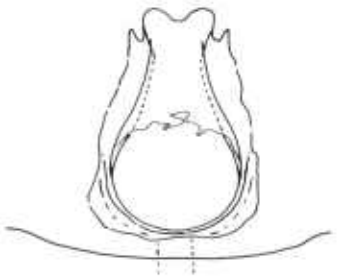
Cydia garacana (Kearfott)

Forewing 5.5 to 6.5 mm long, dark areas grayish brown. Adults captured June 20–July 20. MI, MN. Larva feeds on *Populus*. Syst: Heinrich (1926). Biol: Brown *et al.* (1983).
(9 N, 6 Gm, T)



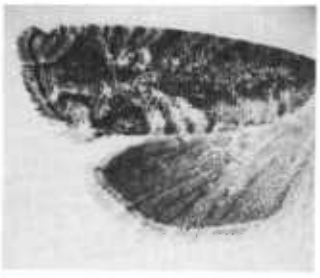
Cydia multilineana (Kearfott)

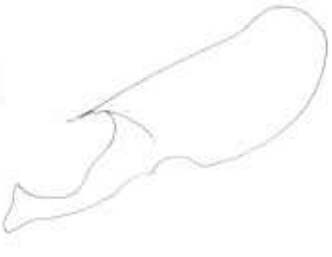
Forewing 6.0 to 7.0 mm long, dark areas grayish brown. Adults captured June 12–29. MI. Syst: Heinrich (1926).
(3 N, 1 Gm, 2 Gf, T)

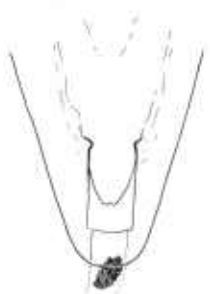


Cydia albimaculana (Fernald)

Forewing 5.0 mm long, dark areas and markings grayish brown or brownish black. Adults captured May 8–20. MI. Syst: Heinrich (1926).
(2 N, 2 Gm, T)

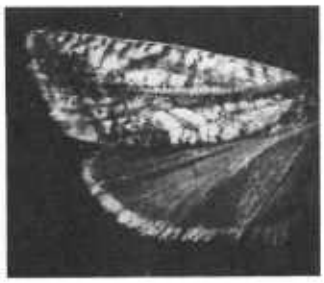




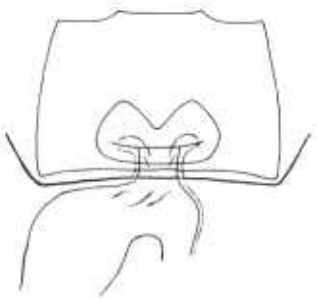


Cydia populana (Busck)

Forewing 5.0 to 7.5 mm long, dark areas grayish brown. Adults captured June 12–July 31. MI. Larva feeds beneath *Populus* bark. Syst and Biol: Heinrich (1926).
(18 N, 5 Gm, 5 Gf, T)

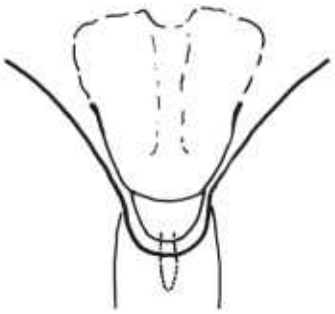


Male unknown



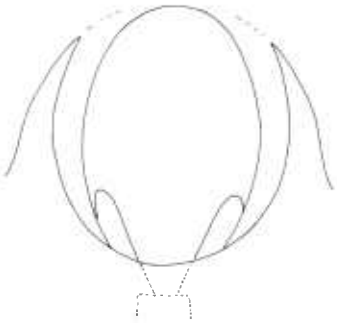
Cydia lacustrina (Miller)

Forewing 8.5 to 9.5 mm long, dark markings dark grayish brown. Adults captured June 6–15. MI. Syst: Miller (1976b). (5 N, 3 Gf, T)



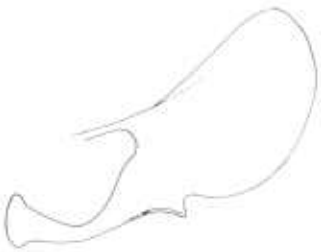
Cydia flexiloqua (Heinrich)

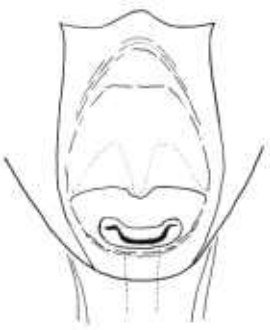
Forewing 6.5 to 7.5 mm long, dark markings dark grayish brown. Adults captured July 3–August 29. MI, WI, MN. Syst: McDunnough (1944).
(6 N, 4 Gm, 2 Gf, T, photo specimen York Co., ON)



Cydia strobilella (Linnaeus). Spruce seed moth

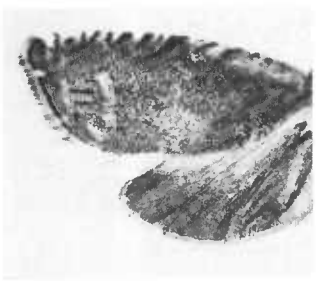
Forewing 3.0 to 5.0 mm long, dark markings dark grayish brown. No capture dates; all adults reared. MI, MN. Larva feeds on *Picea* seeds and cones. Syst: Brown and W.E. Miller (1983). Biol: Tripp (1954).
(9 N, 2 Gm, 2 Gf, photo specimen Carleton Co., ON)

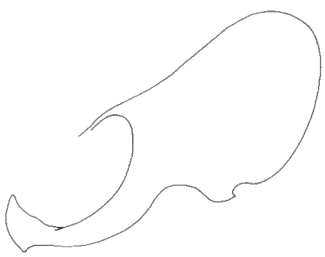


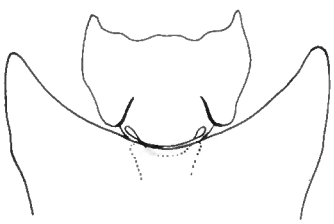


Cydia rusticella (Clerck). Pea moth

Forewing 5.5 to 6.5 mm long, dark areas yellowish brown. Adults captured June 22–August 20. MI, MN. Univoltine. Larva feeds in developing *Pisum* seed pods. Syst: Robinson and Nielsen (1983). Biol: Fluke (1921).
(7 N, 3 Gm, 3 Gf)

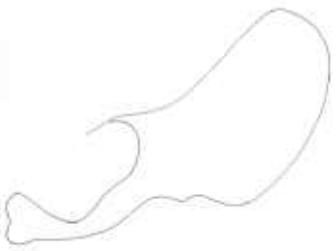
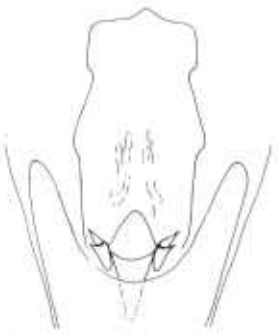






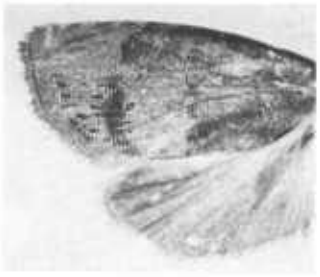
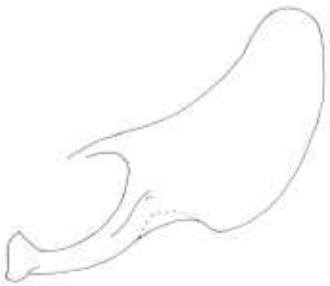
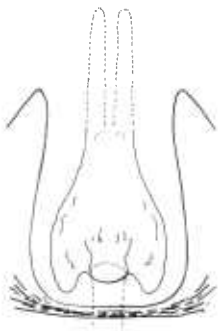
Cydia candana (Forbes)

Forewing 7.5 mm long, dark markings brown. Male hindwing cubital pecten in a pocket. Adult captured May 15. MN. Larva feeds in *Acer* seeds. Syst: Heinrich (1926). Biol: MacKay (1959).
(1 N, 1 Gm, T, photo specimen Boone Co., MO)

Cydia caryana (Fitch). Hickory shuckworm

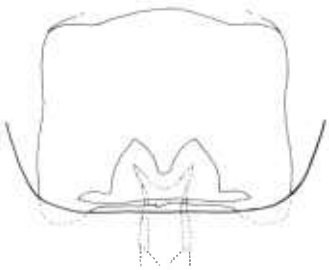
Forewing 5.0 to 6.5 mm long, dark areas brownish black. Male lacks hindwing cubital pecten. Adults captured May 26–September 6. MI. Probably univoltine with protracted emergence period. Larva feeds in husks and fruits of *Carya, C. illinoensis*. Syst: Heinrich (1926). Biol: Payne and Heaton (1975). (8 N, 5 Gm, 2 Gf, T, photo specimen St. Louis Co., MO)

Cydia latiferreana (Walsingham) complex. Filbertworm

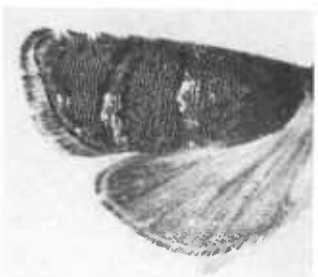
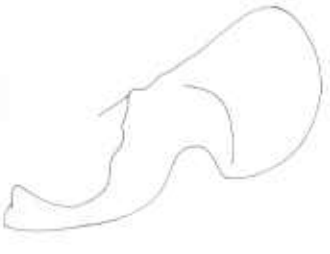
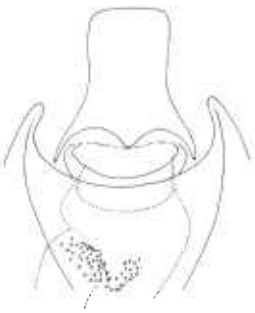
Forewing 6.0 to 9.5 mm long, pale areas orange or brown. Male with dilated scaling on hindmost tibia, without vesical cornuti, with hindwing cubital pecten in a pocket. Adults captured May 3–October 1. MI, WI, MN. Multivoltine. Varieties F and G of Heinrich (1926) confirmed. Larva feeds in *Quercus* acorns. Syst and Biol: Brown (1983).
(50 N, 9 Gm, 3 Gf, T)





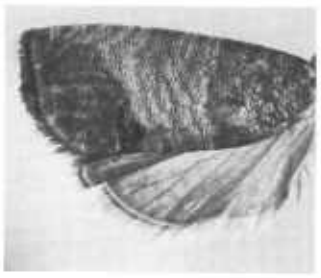
Cydia gallaesaliciana (Riley)

Forewing 5.0 mm long, dark areas brownish black. Adult captured July 8. MI. Larva feeds in *Salix* stem gall. Syst and Biol: Heinrich (1926).
(1 N, 1 Gm, T, photo specimen Boone Co., MO)

Cydia toreuta (Grote) complex. Eastern pine seedworm

Forewing 5.0 to 7.0 mm long, dark markings bordering metallic bands brownish black. Adults captured May 24–July 2. MI, WI, MN. Larva feeds on seeds within cones of *Pinus resinosa, P. banksiana*. Syst: Heinrich (1926). Biol: Harbo and Kraft (1969).
(84 N, 12 Gm, 7 Gf, T)



Cydia pomonella (Linnaeus). Codling moth

Forewing 6.5 to 10.0 mm long, dark apical area yellowish brown. Male hindwing cubital pecten in a pocket. Adults captured April 2–September 12. MI, WI, MN. Bivoltine. Larva feeds on *Pyrus* seeds and fruit. Syst: Brown (1979b). Biol: Putman (1963).
(128 N, 13 Gm, 8 Gf)

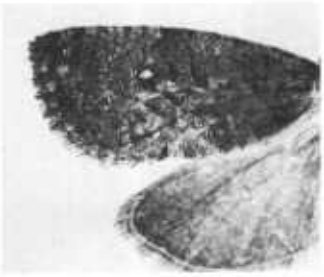
Genus *Ecdytolopha*

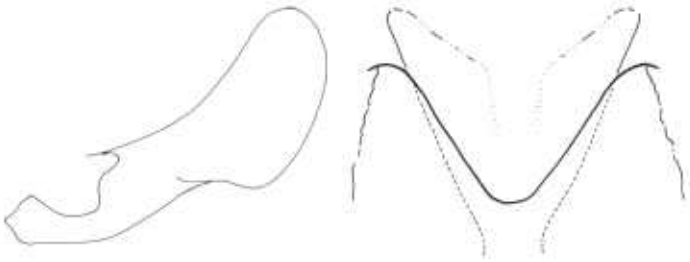
Both sexes. Thorax with posterior tuft. Forewing termen convex, R_1 originating at or near middle of discal cell, upper internal vein of discal cell originating between R_2 and R_3, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, cubital vein with pecten, M_3 and Cu_1 connate or stalked.

Male. Hindwing inner margin modified into a pocket with or without enclosed hair pencil. Abdominal segment 8 without paired lateral tufts. Uncus not developed; socius and hamus absent; valva without rudimentary clasper, without thick spinelike seta on cucullus at lower margin; vesica with cornuti.

Female. Sternum 7 deeply emarginate around ostium bursae, neither inflected nor overlapping ostium bursae. Ductus bursae sclerotized one-third its length from genital opening; corpus bursae with two thornlike signa.

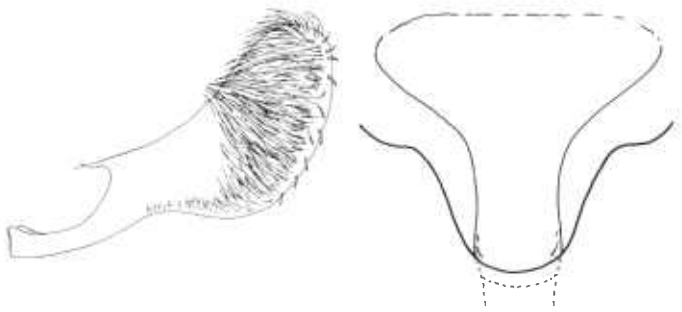
Comments. Five Nearctic species of *Ecdytolopha* are known.





Ecdytolopha punctidiscanum (Dyar)

Forewing 7.5 to 11.5 mm long, dark areas grayish yellowish brown or brownish black. Male with dilated scaling and hair pencil on hindmost tibia. Adults captured June 12–August 17. MI, WI. Larva feeds in *Robinia* stems. Syst: Heinrich (1926). Biol: Prentice (1966).
(46 N, 2 Gm, 4 Gf, T)



Ecdytolopha insiticiana Zeller. Locust twig borer

Forewing 8.0 to 12.0 mm long, dark areas and markings grayish yellowish brown or brownish black. Adults captured May 23–August 12. MI, WI, MN. Larva feeds in *Robinia* rudimentary stem gall. Syst: Heinrich (1926). Biol: Harman and Berisford (1979).
(32 N, 5 Gm, 3 Gf, T)

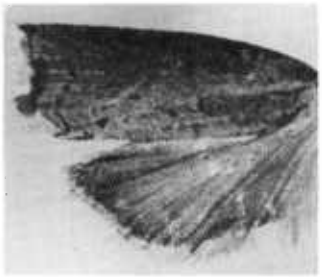
Genus *Pseudogalleria*

Both sexes. Forewing termen concave, R_2 originating equidistant between R_1 and R_3, upper internal vein of discal cell originating between R_2 and R_3, R_3 and R_4 approximate, Cu_2 originating before distal two-thirds of discal cell. Hindwing Rs and M_1 approximate, cubital vein with pecten, M_3 and Cu_1 stalked.

Male. Hindwing inner margin not modified. Hindmost tibia without dilated or tufted scaling. Abdominal segment 8 without paired lateral tufts. Uncus not developed; socius and hamus absent; valva without rudimentary clasper, without thick spinelike seta on cucullus at lower margin; vesica with cornuti.

Female. Sternum 7 deeply emarginate around ostium bursae, neither inflected nor overlapping ostium bursae. Ductus bursae with a sclerotized patch near middle; corpus bursae with two thornlike signa.

Comments. *Pseudogalleria* appears to be monotypic.



Pseudogalleria inimicella (Zeller)

Forewing 7.5 to 11.5 mm long, dark areas reddish brown. Adults captured May 19–June 26. MI, MN. Larva feeds in *Smilax* stem bases. Syst: Heinrich (1923b). Biol: Putman (1942).
(12 N, 3 Gm, 5 Gf, T)

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